NIH Computer Center User's Guide

(OS/390 South System)

November 2000

National Institutes of Health
Center for Information Technology
NIH Computer Center
12 South Drive MSC 5607
Bethesda, Maryland 20892-5607

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DEDICATION

To our "Users," those intrepid individuals

who apply the science of computing to

achieving their organizations' goals.

We appreciate your support and suggestions.

NIH COMPUTER CENTER

FOREWORD

The Center for Information Technology (CIT) supports central computing resources for use by NIH and by many other government agencies. CIT operates the NIH Computer Center, which currently includes the following resources: the OS/390 (MVS) mainframe systems (North System and South System), the Unix-based Enterprise Open Systems, NT Application Servers, enterprise-wide e-mail services, World Wide Web services, and scientific computing resources. CIT provides interoperability among these resources and with other computing facilities. CIT has developed a standard system, called "Titan," for the OS/390 (MVS) platform that will begin accepting production work from the North System later this year.

As part of our commitment to provide you and your organization with state-of-the-art facilities and quality service, we have developed the *NIH Computer Center User's Guide* as the primary reference for reliable information about the OS/390 (MVS) South System. The *NIH Computer Center User's Guide* also serves as an introduction to other facilities offered by CIT.

This publication provides an overview of the South System—including information on policies, standards of service, and administrative information such as registration, security, documentation, and charges, as well as access, major systems, development facilities, printing, networks, storage and backup of data and hardware facilities. There are references to other documents that give more detailed, technical information on specific computing topics.

As part of our commitment to quality service, we first announce any major changes to the OS/390 (MVS) South System in our technical publication, *Interface,* before they are incorporated into the *NIH Computer Center User's Guide*. Occasionally, information that needs more immediate attention is put in the "Message of the Day," which appears when you logon. You are always assured of being promptly informed about changes to our facilities.

We are here to support you in fulfilling your organization’s missions and goals. Please let us know how we can better serve you.

John Dickson, Ph.D., Director
Division of Computer System Services, CIT

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1 ORIENTATION

The *NIH Computer Center User's Guide* is published and maintained by the Center for Information Technology, for those who use the Enterprise Systems of the NIH Computer Center. It describes the services, registration, standards, security-related issues (Section 4), where to go for additional information, and guidance on who to contact for assistance.

The *NIH Computer Center User's Guide* provides a detailed description of the OS/390 (MVS) South System. The other components of the Enterprise Systems—the OS/390 (MVS) North System, the Enterprise Open Systems (EOS), a Unix-based system for general applications and the NT application servers—are only briefly described in this document. Please contact TASC for further information about the North System and the Unix and NT platforms. See Section 1.1.3.1 for more information on the other components of the Enterprise Systems.

CIT has developed an OS/390 (MVS) "standard system" (called Titan) that will ultimately replace both the current North and South Systems. Initial migrations to this system will begin towards the end of year 2000. For more information on this system visit:

http://silk.nih.gov/silk/titan

Any questions about the content or meaning of information in the *NIH Computer Center User's Guide* should be directed to the CIT Technical Assistance and Support Center (TASC). The location and telephone number for TASC and other important groups can be found in Section 1.3.1.

The *NIH Computer Center User's Guide* is updated frequently so that it reflects the latest picture of computing at the NIH Computer Center. Between updates, users are informed of changes via *Interface,* the technical publication that covers services and facilities provided by the Center for Information Technology to NIH and other government agencies. Changes in CIT policies and standards of service, as well as all significant changes made to hardware and software on various platforms at the NIH Computer Center, are announced in this publication. This version of the *NIH Computer Center User's Guide* is updated through *Interface* Number 215, September 15, 2000.

New and prospective customers may obtain an orientation package from the Technical Information Office. Some documentation for the OS/390 (MVS) South System, including the *NIH Computer Center User's Guide*, is available from the World Wide Web. Visit:

http://datacenter.cit.nih.gov

and select "Publications."

1.1 CIT (CENTER FOR INFORMATION TECHNOLOGY)

CIT conducts research and development related to the application of computer methodology to biomedical research, and provides a variety of data processing services on a cost-recovery basis to the NIH and other government agencies.

The Center for Information Technology (CIT) supports NIH's research and management programs with efficient, cost-effective information systems, networking services, and telecommunications services. As part of its mission, CIT:

- provides leadership for determining NIH's computational and telecommunications needs and oversees development of infrastructure support
- operates a state-of-the-art regional computer facility responsive to the NIH mission
- develops NIH information technology policy to implement policy and legislation
- provides policy and standards leadership within NIH by identifying and communicating NIH information technology issues, problems and solutions
- establishes and operates the necessary organization and infrastructure to assure security, connectivity, and interoperability across the NIH
- serves as a Federal Data Center for administrative, biomedical, and statistical computing
- provides data processing and high-performance computing facilities, integrated telecommunications data networks, and services to HHS and other Federal agencies

This section briefly describes some of the components of the Center for Information Technology.

For more information on CIT visit:

http://cit.nih.gov

For a directory of useful World Wide Web addresses, see Section 11.2.

1.1.1 Office of the Chief Technology Officer (OCTO)

The Office of the Chief Technology Officer advises the CIT Director on the computational and telecommunications needs of the NIH community and provides analysis and guidance in developing systems supporting NIH-wide IT initiatives. In addition, OCTO evaluates new technologies, provides planning guidance for CIT programs and services, and coordinates IT architectural management for the NIH.

1.1.2 Office of the Deputy Chief Information Officer (ODCIO)

The Office of the Deputy Chief Information Officer advises the Chief Information Officer (CIO) on the direction and management of significant NIH IT program and policy activities under relevant Federal statutes, regulations and policies. It also develops, implements,

manages, and oversees NIH IT activities related to IT legislation, regulations, and NIH and other Federal policies.

ODCIO directs NIH's IT capital planning processes with regard to major IT investments, and provides leadership to NIH Institutes and Centers (ICs) to enhance and strengthen their IT program management so they comply with legislative and policy requirements. The ODCIO serves as the principal NIH liaison to the DHHS, its OPDIVs, and other Federal agencies on IT matters. In addition, ODCIO identifies critical IT issues and analyzes, plans, leads, and manages the implementation of special DHHS or Federal initiatives as they relate to the management of NIH's IT resources. ODCIO also collaborates with NIH managers responsible for IT-related functions.

1.1.3 Division of Computer System Services (DCSS)

The Division of Computer System Services (DCSS) plans, implements, operates, and supports centrally owned or administered computing resources for NIH enterprise use, ensuring interoperability among those resources and between them and other computing facilities owned by customer organizations. DCSS also supports the Helix and ALW systems for NIH scientists. DCSS promotes awareness and efficient and effective use of these computing resources by customer personnel through training, presentations, consultations, and documentation.

DCSS investigates new and emerging computing requirements of customer programs. It conducts research and development to identify, evaluate, and adapt new computer architectures and technologies to meet identified customer requirements and to enhance current service offerings. Additionally, where appropriate, DCSS manages and operates departmental computing resources for IC, Office, or Center use.

The Division of Computer System Services administers the NIH Computer Center. DCSS also operates enterprise-wide e-mail services and World Wide Web services for NIH. Designated as a HHS consolidated data center, the NIH Computer Center encompasses several interconnected multi-computer facilities (OS/390-MVS, Unix, and Windows NT/2000). This manual fully describes the OS/390 (MVS) South System. See Section 1.1.3.1 for more information about the other components of the Enterprise Systems of the NIH Computer Center.

1.1.3.1 Enterprise Systems

The multi-platform Enterprise Systems are composed of the OS/390 (MVS) North System, the OS/390 (MVS) South System, the OS/390 (MVS) "standard system" (called Titan) (4th quarter 2000) the Enterprise Open Systems (Unix), and Windows NT/2000 application servers.

For more information on all these systems, visit:

http://datacenter.cit.nih.gov

The wide variety of services of the Computer Center's OS/390 (MVS) South Enterprise computing facility is described in this *NIH Computer Center User's Guide.* Users of the OS/390 (MVS) South System have access to batch processing, interactive systems (TSO, WYLBUR, DB2), Web facilities, statistical software packages, language compilers, database/transaction processing, client/server technology, terminal emulation and file transfer for desktop computer connectivity, automatic backups, online services, custom printing, and data security protection.

The Enterprise Systems support work from NIH and many other government agencies. Enterprise Systems customers can access scientific and administrative data and applications, as well as develop new applications to meet the needs of a lab, an office, an agency, or a worldwide community of collaborators using the appropriate platform for their applications.

In general, the NIH Computer Center operates on a fee-for-service basis; that is, charges to customers are based on the resources they use. The economies of scale possible in a complex as large as the NIH Computer Center have resulted in computing costs declining or remaining unchanged for each of the last 25 years.

NIHnet, a wide area network supported by CIT, encompasses NIH facilities across the nation with connections to other agencies worldwide. It provides high-speed file transfer and interactive access from networked workstations. Expanding network services enable users to communicate with other systems locally and worldwide. Access to full-screen applications from personal computers and ASCII terminals is available through either network or dialup connections.

To acquaint users with the full extent of services, CIT provides consulting, training, and documentation. This manual is intended to provide users with a general description of what the system offers and how to use it effectively.

Brief descriptions of the other Enterprise systems follow:

OS/390 (MVS) North System
This system is based on the OS/390 operating system using job control language as the user interface and the Job Entry Subsystem Version 2 (JES2).

Interactive systems:
- CICS
- ISPF
- TSO
- ACS WYLBUR

Databases:
- ADABAS
- Model 204

Language processors:
- APL
- COBOL/370
- FORTRAN 77
- PL/I

Graphics systems:
- SAS/GRAPH
- Scientific Statistical Systems
- SAS
- SPSS-X (Statistical System for Social Sciences Extended)
- TPL (Table Producing Language)

Simulations systems:
- Dynamic Model II (DYNAMO II)
- General Purpose Simulation System (GPSS)

SILK Web facilities (http://silkad.nih.gov):
- public and secure servers for general use
- online services

Other:
- File management systems (VISION:Builder and VISION:Report)
- IBM BookMaster document markup system
- IBM BookManager online documentation system

Enterprise Open Systems (EOS)
The Enterprise Open Systems provide a stable software and data-repository environment for enterprise-wide database and information systems using Compaq/Digital AlphaServers. EOS is a Unix-based environment that hosts a variety of production and development applications at the NIH Computer Center. For more information, refer to the *Enterprise Open System User's Guide*, available from the CIT publication ordering facility.

Operating system: Tru64 UNIX

Installed software (commercial):
- DEC COBOL
- DEC C
- DEC C++
- Netscape Enterprise Server
- Oracle Web Application Server

Database:
- Oracle

Windows NT/2000 Application Servers

Windows NT and Windows 2000-based applications can be hosted on CIT servers that are carefully managed and monitored on a 7x24 basis. This facility provides a computing environment suitable for critical enterprise-wide applications.

Operating system: NT/2000 4.0

Other facilities:

- Databases: Microsoft SQL Server
- NBARS: automatic backup/recovery services
- Web Facilities: IIS Web Server
- User-specified software

1.1.3.2 Helix Systems

The NIH Helix Systems comprise several systems configured in a unified scientific environment. An SGI Challenge system (with the network name helix) is used for general purpose tasks, such as reading mail, transferring files, accessing the World Wide Web through Netscape, and certain scientific applications. Additional systems offer special computation capabilities that enable compute-intensive scientific applications to run faster or more efficiently. An SGI PowerChallenge system (with the network name churn) augments helix by running specific scientific applications or user programs that require long execution times. The NIH Biowulf Cluster (with the network name biowulf) is a Beowulf parallel processing system designed and built by members of the Helix Systems staff, running the Redhat Linux operating system.

A 32-processor SGI Origin 2000 system (with the network name galaxy) is designed for the development and execution of high performance parallel applications. The Origin 2000 is jointly funded by the Division of Computer System Services (DCSS) and the Division of Computational Bioscience (DCB).

In addition to the standard Unix tools for software development, text formatting, and network communications, software packages for the Helix System include:

Scientific applications:

- GCG Sequence Analysis Package: an extensive package of programs for nucleic acid and protein sequence analysis
- Quest: interactive database search program for accessing the Cambridge Structural Database
- BLAST: basic local alignment search tool for nucleic acid and protein sequences
- Lrna: performs suboptimal folding on linear RNA sequences

- CHARMm: models dynamic behavior and characteristics of molecular systems
- Gaussian: performs semiempirical and *ab initio* molecular orbital calculations
- Mathematica, MATLAB, S-PLUS: interactive systems for numerical analysis and graphics featuring, respectively, symbolic manipulation, matrix computation, and statistical analysis
- AVS and Interactive Data Language (IDL): interactive programs for analyzing and visualizing data
- Fastlink: fast-executing computationally intensive general pedigree programs from Linkage
- Fasta3: uses the Pearson-Lipman algorithm to compare a protein or nucleotide sequence against a sequence database (includes fasta, tfasta, tfastx, fastx, ssearch)
- ClustalW: general-purpose multiple alignment program for DNA or protein sequences
- Porpoise: alert service for new scientific literature that searches the weekly updates of the Science Citation Index Expanded and Social Sciences Citation Index databases
- WHALES: automatic alert service for new sequences in the major nucleotide and protein databases

Biological databases:
- GenBank: nucleic acid sequences
- PIR: protein sequences
- GCG: sequence databases for the GCG package
- PDB: protein structures
- Cambridge Structural Database: diffraction data from small organic and organometallic molecules

Programming languages:
- C, FORTRAN, Lisp, and C++

Subroutine Libraries:
- IMSL: mathematical and statistical routines
- FIGARO: 2- and 3-d interactive graphics routines

Programming tools:
- static analyzer, debugger, performance analyzer tools

Network services:

- mail, pine, and Emacs rmail: electronic mail readers
- ftp: Internet file transfer utility
- kermit and zmodem: file transfer via modem
- X Window System: supports common X clients such as xterm, and S-PLUS, Mathematica, MATLAB and AVS applications
- Netscape, lynx: easy access to information from NIH information servers and information servers worldwide
- tin: newsgroup reader
- WebTermX: Web browser plug-in that lets Windows PCs run the X Window System

Editors:

- vi, edt, and GNU Emacs: full-screen editors
- ed and ex: line editors

The Technical Information Office provides documentation for users of the Helix Systems. Use the CIT publication ordering facility to order these manuals (see Section 6).

Additional information about the Helix Systems is available from the World Wide Web at:

http://helix.nih.gov

1.1.3.3 Advanced Laboratory Workstation (ALW) System

CIT provides network-based support for general purpose, open, distributed computing via the Advanced Laboratory Workstation (ALW) System. Customer-owned Unix workstations connect to a world-wide distributed file system (AFS) via NIHnet, the NIH wide area network, to access shared resources and services such as file backup, software maintenance, security monitoring, scientific and office applications, online documentation, and the Internet. ALW administration is performed by the system, allowing the users to concentrate on their research.

ALW System workstations are particularly suitable for scientific applications requiring high performance desktop computing or graphics, or access to large amounts of data. These workstations are manufactured by a variety of vendors.

The most popular applications include medical image processing, DNA and protein sequencing and searching, statistical analysis, and molecular graphics and modeling. Applications offered include:

Genomic sequence analysis packages:

- Refer to http://www-bimas.cit.nih.gov

Image processing:

- Analyze - medical image processing
- Khoros - abstract visual language
- MEDX - medical image processing

Mathematics packages:

- Mathematica
- Matlab

Molecular modeling:

- Refer to http://cmm.info.nih.gov/modeling

Statistical packages:

- Prophet
- SAS
- S-PLUS

Office automation applications:

- Applix - integrated spreadsheet, word processing and graphics
- FrameMaker - desktop publishing
- WordPerfect - word processing

Other software:

- Emacs - text editor
- Gnu software and development tools
- Internet Explorer - Web browser
- Netscape - Web browser
- PTR - problem tracking reporting system for ALW
- Softwindows95 - Windows95 emulator

Additional information about the ALW System is available on the Web at:

http://www.alw.nih.gov

1.1.4 Division of Computational Bioscience (DCB)

The Division of Computational Bioscience coordinates and manages all CIT activities related to the conduct and support of NIH research in computational biosciences and statistics, communicating and collaborating with researchers both within and outside NIH. The Division applies computing technology to research involving molecular structure determination and modeling, protein and DNA sequence analysis, and biomedical imaging. In addition, DCB conducts and supports research in mathematical theory and biophysical instrumentation to explain biological phenomena in terms of chemistry and physics and conducts research and development in computer science and computational engineering. DCB also promotes the application of high performance computing to biomedical research.

1.1.5 Division of Enterprise and Custom Applications (DECA)

The Division of Enterprise and Custom Applications supports the NIH enterprise business process through the development and management of both transaction and decision-support environments for administrative and business applications of the NIH, such as procurement, budget, accounting and human resource activities. DECA provides systems analysis, programming, application services to the NIH ICs and other Federal agencies, and database administration and management services to the NIH. DECA also provides the NIH community with World Wide Web development, support services, and consulting services for applications development.

1.1.6 Division of Network Systems and Telecommunications (DNST)

The Division of Network Systems and Telecommunications directs the engineering, design, implementation, and support of network infrastructure and services for the NIH wide area network (NIHnet) to facilitate the use of scientific, administrative, and other business applications. The Division manages and directs NIH telecommunications systems and develops technical requirements for the NIH ICs and implements telecommunications programs to meet the needs of the NIH community.

DNST researches, develops, and tests next-generation networking/ telecommunications technologies and develops and supports applications using new network technologies, such as telemedicine and video conferencing. It provides consulting, guidance and support to the ICs, helping them to meet their network requirements. To improve the information infrastructure on networking/telecommunications activities, DNST serves as liaison to the NIH ICs and other DHHS components.

DNST serves as the focal point for telecommunications service orders, and develops and disseminates recommended standards, policies, and procedures for the nationwide implementation and management of NIH networking and telecommunications systems. DNST also develops, implements, and supports remote access services to NIHnet, provides technical support for wireless services, and a 24-hour telephone/network support service.

1.1.7 Division of Customer Support (DCS)

The Division of Customer Support provides centralized, integrated computer support services to the NIH computing community. DCS advocates customer needs to CIT management and represents services and policies to CIT's customers. It plays an active and participatory role in supporting desktop computing to the end user in the areas of software and hardware, including Internet, communications, and access technologies. DCS also coordinates and oversees CIT's Training Program (see Section 5.3) for the benefit of the NIH computing community. In addition to providing a central account establishment and management services for access to CIT systems, DCS also manages an NIH-wide help desk (TASC), distributes documentation, and implements service request systems.

The Division of Customer Support is also responsible for providing statistical and mathematical software, training on the use of the software, statistical advice, and interpretation of output. This service is readily available for the support of all computer users employed by the ICs (Institutes and Centers) of the NIH community, as well as those employed by other government agencies and/or representatives of organizations that are under contract to perform government work. The program library includes the following software packages that run on the OS/390 (MVS) South System:

- BASE SAS - foundation of the SAS system
- BMDP - Biomedical computer programs (P series)
- IMSL - International Mathematical and Statistical Library
- MSTAT1 - mathematical and statistical FORTRAN subroutines
- SAS/ACCESS Software for Relational Databases - DB2 Interface
- SAS/ACCESS Software for Relational Databases - Oracle interface
- SAS/AF - application facility
- SAS/ASSIST - interface to the SAS system
- SAS/CALC - SAS spreadsheet
- SAS/CONNECT - cooperative processing product
- SAS/EIS - tool to build graphical user interface applications
- SAS/ETS - econometric and time series procedures
- SAS/FSP - full screen procedures
- SAS/GRAPH - SAS graphic subsystem
- SAS/IML - Interactive Matrix Language
- SAS/INSIGHT - interactive tool for data exploration and analysis
- SAS Online Tutor – online training
- SAS/OR - operations research tools

- SAS/Oracle - SAS, Oracle interface
- SAS/QC - SAS quality control
- SAS/SHARE - provides concurrent access to data
- SAS/STAT - advanced statistics procedures
- SAS/TOOLKIT - interface to SAS for user written PROCs
- SPSS - Statistical Package for the Social Sciences
- SUDAAN - Survey Data Analysis

Contact TASC if you have questions concerning these software packages.

1.2 MAPS AND DIRECTIONS

The NIH Computer Center and its associated offices are in Buildings 12, 12A, and 12B on the NIH campus at 9000 Rockville Pike, Bethesda, Maryland 20892. The map below is an abstract illustration of the NIH Campus showing the general locations of the buildings, parking areas, and main roads. Parking is extremely limited, and there is a charge for visitor parking. Visitors are encouraged to use public transportation.

Figure 1-1. Map of the NIH Campus

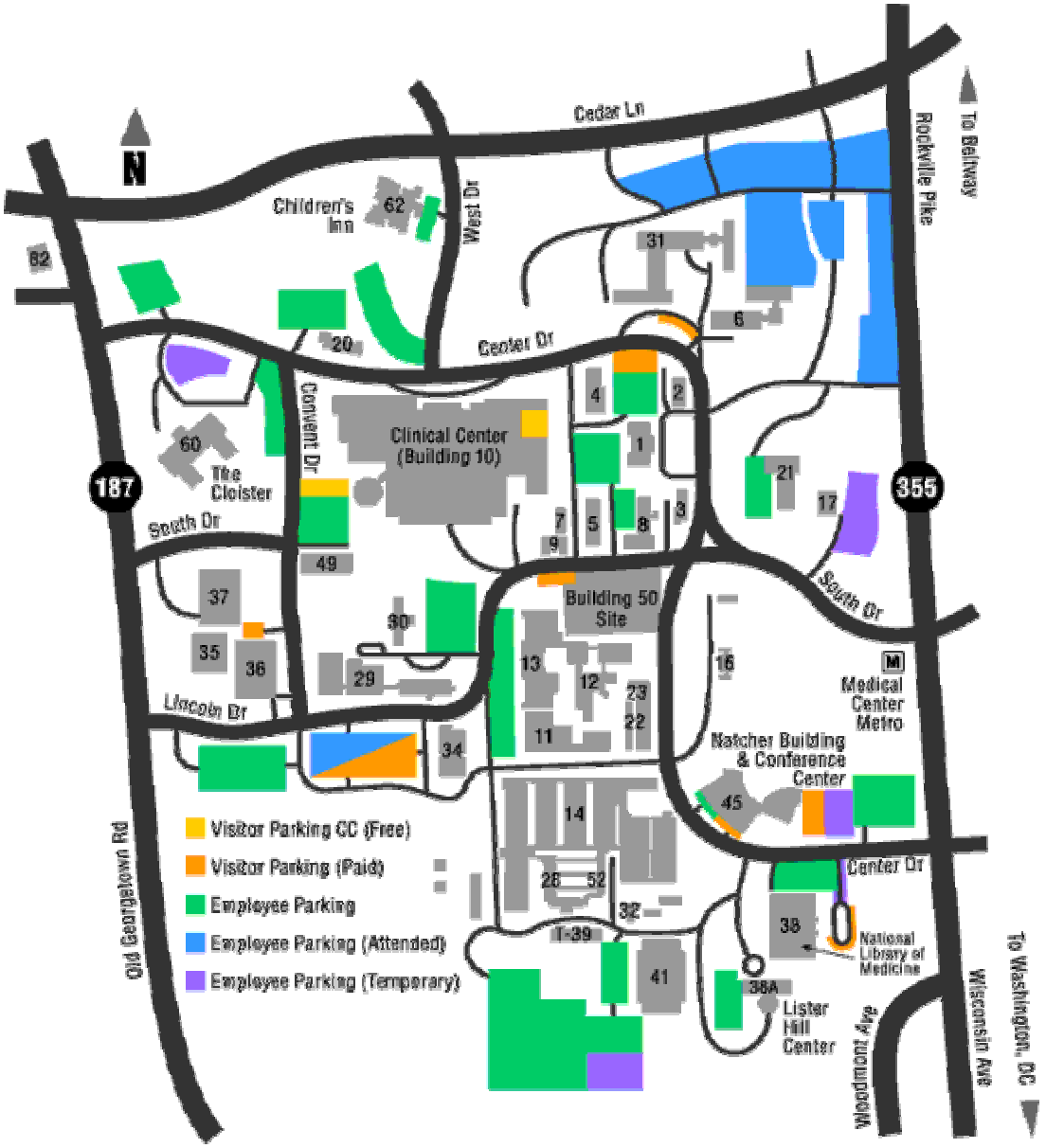


Figure 1-2. Map of Washington Area

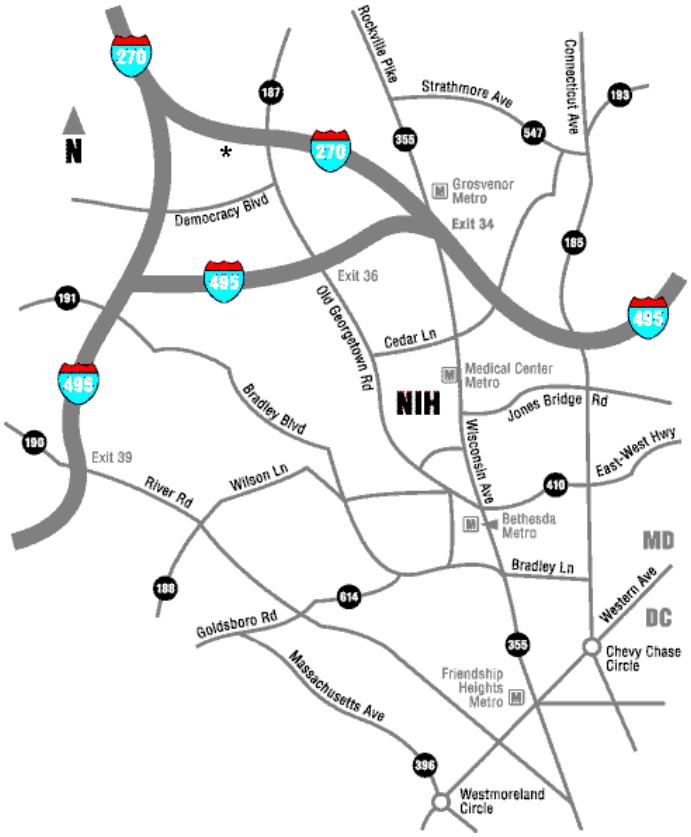
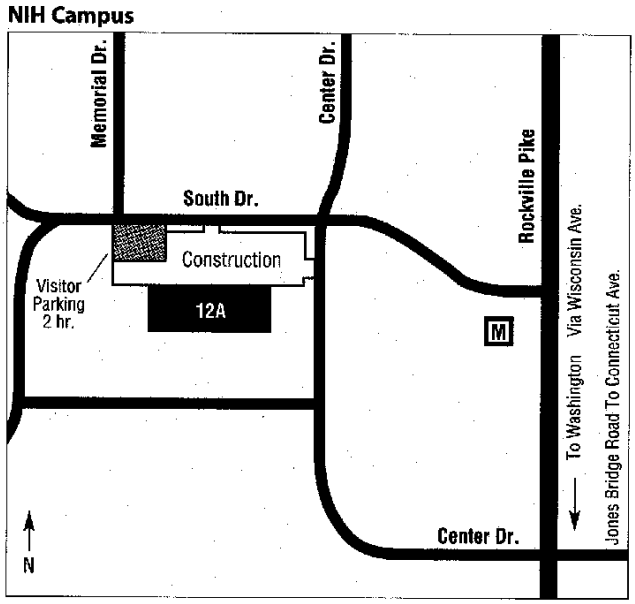


Figure 1-3. Map of CIT



Directions to the NIH Computer Center

By subway:

- Take the Metrorail Red Line to Medical Center stop.
- Continue walking forward down south Drive after getting off the escalator.
- Cross the intersection of Center Drive (stop sign). The NIH Computer Center (Building 12A) is on the left.

See map for Metrorail.

By car:

Interstate 495 Westbound

- Take exit 33B Connecticut Avenue (Chevy Chase).
- Turn left onto Connecticut Avenue.
- At first traffic light, Jones Bridge Road, turn right.
- Cross Rockville Pike and drive .4 of a mile on Center Drive. The NIH Computer Center (Building 12A) is on the left.

Interstate 495 Eastbound

- Take exit 34B Wisconsin Avenue/Bethesda.
- Drive approximately two miles south on Rockville Pike.
- At the fourth traffic light, South Drive, turn right.
- At the stop sign, Center Drive, turn left. The NIH Computer Center (Building 12A) is on the right.

Interstate 270 (from Gaithersburg)

- Take I-270 to Rte. 495 Washington (East).
- Exit Rte. 495 at Rte. 355 (Wisconsin Avenue).
- Drive approximately two miles south on Rockville Pike.
- At the fourth traffic light, South Drive, turn right.
- At the stop sign, Center Drive, turn left. The NIH Computer Center is on the right.

Wisconsin Avenue (from D.C.)

- Proceed north from the District to 8600 Rockville Pike (1st traffic light, Center Drive, at north end of Bethesda Business District, after the Ramada Inn).
- Turn left and go approximately .4 of a mile. The NIH Computer Center (Building 12A) is on left.

NIH visitor parking is extremely limited and there is a charge. The use of carpools and public transportation is encouraged. The NIH Police strictly enforce all parking regulations.

To get to CIT by bus:

- Metrobuses and Montgomery County RideOn buses make stops at the Medical Center Metro stop. Some Metrobuses make regular stops at several NIH locations.
- Call Metro information for time schedules and routes (202) 637-7000.

1.3 TELEPHONE NUMBERS

This section contains a telephone directory to key services. Users without a network connection can access WYLBUR and TSO (as well as the Silicon Graphics component of the Helix Systems) via FTS2000 using an asynchronous ASCII Teletype-compatible terminal. Persons calling 402, 435, 443, 480, 496, 594, or 827 exchange telephone numbers from other 402, 435, 443, 480, 496, 594, or 827 numbers are required to use only the last five digits of the phone numbers.

The area code for the NIH Computer Center is 301. For long distance users whose data phones are not on the FTS2000 system, the interactive services are available through 800 numbers.

See Section 7.1 for the specific phone numbers for dialup access to the mainframe facilities.

1.3.1 Computer Services

Note: The Area Code is 301. All Telephone numbers are accessible through FTS.

Figure 1-4. Computer Services

SERVICE	OFFICE	BLDG./RM	TELEPHONE
ENTERPRISE SYSTEMS (OS/390-MVS, Unix, and NT)			
Database Support	Database Systems Branch	12/2200	496-9158
IMS Support	Database Systems Branch	12/2200	496-6244
Help Desk	TASC	12A/1011	594-6248
New Applications	Application Services Branch	12A/4011	496-5524
Operating Schedule - MVS (recording)	--	--	402-2211
Security Investigations and Assistance	TASC	12A/1011	594-6248
Fax Number	--	--	496-6905
Security Policy	Application Services Branch	12A/4011	496-5524
Tape Library	Systems Operations Mgmt. Branch	12/1100	496-6021
SCIENTIFIC SYSTEMS (Helix and Advanced Laboratory Workstation)			
Help Desk - ALW**	TASC	12A/1011	594-6248
Help Desk - Helix	TASC	12A/1011	594-6248
Operating Schedule – Helix, EOS (recording)	--	--	402-2212
Operator - Helix	--	12/2200	496-6755
CONNECTIVITY SERVICES (E-mail, Networks, File Transfer, Access to Enterprise and Scientific Systems)			
Help Desk	TASC	12A/1011	594-6248
GENERAL SERVICES			
Accounts/Billing, Registration	TASC	12A/1011	594-6248
ADB Support**	TASC	12A/1011	594-6248
Application Programming**	Division of Enterprise and Custom Applications	Federal Bldg.	594-6248
Computer Center General Policy	Director, Division of Computer System Services	12A/4039	496-5381
Computer Center Security Policy	Chief, Application Services Branch	12A/4011	496-5524
DECnet**	Division of Enterprise and Custom Applications	31/3B27	402-1811
Disaster Recovery Process	Disaster Recovery Coordinator	12A/4033	496-5826
Documentation/Publications	Technical Information Office	12A/1011	594-6248
Output Distribution and Foreign Tape Handling			
NIH Campus	Output Distribution	12A/1000	496-6183
Parklawn Building	Output Distribution	2B70	443-4253
Public Information on CIT	Information Office, CIT	12A/4063	496-6203
Special Tape Handling	Output Distribution	12A/1000	496-6183
Statistical Packages	TASC	12A/1011	594-6248
TDD Line for Hearing Impaired	TASC	12A/1011	496-8294
Telecommunications Problems	TASC	12A/1011	594-6248
Training	TASC	12A/1011	594-6248

*Non-NIH number; requires "9" prefix. **Services available to NIH employees only.

World Wide Web access to CIT through http://cit.nih.gov

1.3.2 Online Telephone and E-mail Directories

There are several online directories available:

- The NIH Directory and E-mail Forwarding Service (see Section 11.4) can be accessed from any Internet-connected computer. A Web-based change form can be used to keep entries up-to-date. You can access this directory through the World Wide Web at:

  http://directory.nih.gov

- The SILK Web Locator facility lets you find names, addresses, registered initials, and telephone numbers for all CIT registered users. In addition, there are links to the NIH telephone and e-mail directories, and the HHS employee directory. If you search by the name (or a part of the name) the display shows the initials, full name, address, and phone numbers for any person(s) matching the request and a link to the NIH e-mail directory if the person works for NIH. If you specify the three-character set of registered initials, you can learn the name, address, and phone number of the individual and a link to the NIH e-mail directory. If you specify the four-character CIT account, the display shows the registered initials and phone numbers for the account sponsor (and alternate) and deregistration official (and alternate). Access the SILK Web Locator at:

  http://silk.nih.gov/locator

- WYLBUR users can access the information in the NIH Telephone Directory through the ENTER PHONE command (Section 12.10.2). This command displays the name, phone number, address, and organization of anyone at NIH. The Computer Center has made available a set of public initials, IHN on account ZPPZ, to permit anyone to access the online NIH Telephone Directory.

- The WYLBUR ENTER NAMES command (Section 12.10.2) displays directory information (including the registered initials) for most Computer Center users, regardless of agency association.

1.4 OPERATING HOURS

Although the OS/390 (MVS) component of the Computer Center operates on a seven-day 24-hour basis, the availability of individual services varies. The operating hours for all the Enterprise Systems (North, South, Enterprise Open Systems, and NT Application Servers) can be found on the World Wide Web at:

http://silk.nih.gov/public/public.schedule

or as a WYLBUR public data set, &PUBLIC.SCHEDULE.

Figure 1-5. Operating Hours

OS/390 South System Service and Day	Hours
Batch Processing	
Monday-Saturday	24 hours
Sunday	2:00 a.m. - midnight
Output Distribution Services	
Monday-Friday	24 hours
Weekends	As workload dictates
WYLBUR, TSO, and Remote Batch Service	
Monday-Saturday	24 hours
Sunday	2:00 a.m. - midnight
DB2 Batch Service	
Monday-Saturday	24 hours
Sunday	3:00 a.m. - midnight
DB2 Interactive Service	
Monday-Saturday	24 hours
Sunday	3:00 a.m. - midnight
IMS (restricted availability)	
Monday-Friday	8:30 a.m. - 6:00 p.m.
Technical Information Office	
Monday-Friday	8:00 a.m. - 5:00 p.m.
TASC - Consulting Desk	
Telephone support, Monday-Friday	7:00 a.m. - 6:00 p.m.
Walk-in support, Monday-Friday	7:30 a.m. - 5:00 p.m.
CIT Training Program	
Monday-Friday	8:00 a.m. - 5:00 p.m.
Information Media Library	
Monday-Friday	7:30 a.m. - 5:00 p.m.
Other Offices	
Monday-Friday	8:30 a.m. - 5:00 p.m.

Call the Operating Schedule number, listed in Section 1.3.1, anytime after Thursday morning to get information on the status of service to be provided during the weekend and upcoming holidays. Special arrangements for service beyond the announced schedule may be possible

if needed; contact the head of Computer Operations through CIT's TASC (Technical Assistance and Support Center).

Unattended Service
Unattended service allows the use of some portions of the OS/390 (MVS) services during periods of time (such as holidays) when these services would otherwise be unavailable. Go to:

http://silk.nih.gov/public/public.schedule

or see the WYLBUR data set &PUBLIC.SCHEDULE for information about specific holidays when unattended service will be in effect and the limitations on unattended service.

Unattended service currently consists of WYLBUR, TSO, and DB2 (interactive and batch) availability. Users are able to do most of their regular WYLBUR-based, TSO-based, and DB2-based tasks during the unattended service period. Only batch-based services that do **not** require tape access are available. During unattended service:

- No jobs are printed and no tapes are mounted.
- Some migrated data sets and data set backups are not accessible (e.g., some NBARS data sets).
- ENTER SUBMIT jobs that require tapes may not be completed on these days.
- Normal OUTPUT HOLD time limits are enforced.
- No one is available to identify or resolve problems. If a system problem occurs (e.g., causing WYLBUR or TSO to "crash") it will not be corrected until attended service resumes.

1.5 PROPER USE OF THE NIH COMPUTER CENTER

Users and account sponsors are responsible for the proper use of resources under the accounts and registered initials under their control.

Standards for using Computer Center facilities are set forth in the *NIH Computer Center User's Guide* and users should consult the appropriate section (or other appropriate publications referenced herein) before using an unfamiliar facility for the first time. If a facility is not described in the *NIH Computer Center User's Guide*, contact TASC for assistance before attempting to use it. Often an alternate procedure is supported. In general, the system software protects itself against user errors, but occasionally problems do arise. If a user is causing system problems and cannot be reached by Computer Center staff, the user's initials will be made unusable until contact is made.

It is illegal to use government computer resources for personal or recreational purposes. The unauthorized use of computing facilities is covered in the Office of Government Ethics "Standards of Conduct" (5 C.F.R. Section 2635.704). Such use may constitute a criminal

violation under Title 18 of the United States Code, Section 641 and other relevant sections. Personal use includes the generation of social mailing lists, personal correspondence, programs to process household financial records, etc. Recreational use includes the creation of artwork and calendars with no work-related purpose and the playing of games. The NIH Computer Center has a specific policy against playing games even in learning situations.

In addition, it is prohibited to produce, store, display, or transmit material that is sexually explicit, suggestive or otherwise offensive on government computing resources or facsimile machines.

Any user who receives or detects an inappropriate use of e-mail or other electronic resources should report it to a supervisor and local area network (LAN) administrator. Immediate action will be taken against any user found to be using Computer Center resources improperly. Federal Information Processing (FIP) resources are to be used solely in support of Federal missions. Employees who use FIP resources in a manner prohibited by the EEOC guidelines or HHS Standards of Conduct will be subject to disciplinary action, up to and including suspension.

The ability to share stored data is one recognized advantage of the enterprise computing environment. However, access to or the use of information (e.g., data, systems and applications programs) stored on the OS/390 (MVS) component of the NIH Computer Center is the sole responsibility of the "owner"—the account sponsor or registered user—of such information. Information belonging to other users or to the NIH Computer Center may not be accessed, regardless of the degree of access control applied to it, without the explicit permission of the owner unless the information is stored in a facility which is intended for general availability, such as the World Wide Web, public libraries, or cataloged procedures. Unauthorized access to data is a breach of Federal privacy/security regulations. (See Section 4.)

Particular care must be taken in use of inter-user communication facilities such as electronic mail and the WYLBUR TO command. Use of these facilities to harass other users, send obscene messages, or perpetrate jokes is a clear misuse of federal computing resources. In addition, electronic mail must be addressed to the specific persons who are intended to receive the mail; indiscriminate sending of electronic mail, either as bulk mail to many recipients or as mail to a random recipient, is not allowed.

Software distributed by the NIH Computer Center, CIT, is obtained under a variety of legally binding license agreements that restrict the use, duplication, and transfer of the software and associated documentation. Unauthorized use, duplication, and/or distribution of this software can result in penalties for both the individual responsible and the National Institutes of Health, including civil damages up to $50,000 for each occurrence and criminal penalties including fines and imprisonment.

Each software package and associated documentation distributed by the Computer Center is authorized for limited use in conjunction with the services provided by the NIH Computer Center. This software and documentation may not be duplicated or transferred to any other individual or facility. Each user who requests and receives software distributed by the NIH Computer Center is responsible for insuring its proper use. In the event of improper use, unauthorized copying or redistribution of the software and/or associated documentation, the NIH Computer Center will contact the responsible user and account sponsor for corrective action. If questions arise about software distributed by the NIH Computer Center, please contact the TASC consulting desk.

1.6 CONTRACTING GUIDELINES

When an organization is preparing or administering a contract for software to be used at the NIH Computer Center, particular attention should be paid to the following sections of the *NIH Computer Center User's Guide*:

1	ORIENTATION
2	REGISTRATION AND DEREGISTRATION
4	SECURITY AND DISASTER RECOVERY
5.1	SOFTWARE SUPPORT
5.2.5	Assistance for Implementing Non-NIH Software
8.1.1.2	Software Features Not Permitted At NIH
10	BATCH JOB SERVICES

In addition, the contracting office and account sponsor should be familiar with the *NIH Computer Center User's Guide*.

The *NIH Computer Center User's Guide* defines the Computer Center's current software standards; however, these change with the passage of time in response to the needs of our users and developments in computer technology. Because of this, it is a good idea to discuss the proposed software with the Application Services Branch (ASB) before the contract is finalized. ASB will be able to provide some guidance concerning hardware and software changes which may occur in the relatively near future. The Application Services Branch is

also familiar with many alternatives that may be used in place of standard IBM facilities and other software whose use is not permitted at NIH.

1.7 ACCESS FOR PERSONS WITH DISABILITIES

It is important that all of our users have full access to Computer Center services and facilities. The Americans with Disabilities Act of 1992 was passed to ensure that persons with disabilities have equal opportunities and guarantees of civil rights. "Reasonable" accommodation, access to facilities and alternate forms of media and communication are inherent in the implementation of the Act. Users with special needs who would like to make suggestions concerning the accessibility of the NIH Computer Center and its related CIT services should contact TASC or submit a Service Request Ticket (see Section 5.2.2).

The NIH Computer Center and the associated offices of CIT, such as the Technical Assistance and Support Center (TASC) and the CIT Computer Training Program, are located in a wheelchair-accessible building. Individuals who are hearing or speech-impaired can contact any person or office within the Center for Information Technology via a TDD (Telecommunications Device for the Deaf) located in the office of the Computer Training Program. The TDD is answered during the office's regular hours.

All users, including individuals with disabilities, are welcome to attend any course in the CIT Computer Training Program for which they meet the technical and administrative prerequisites. There is elevator service to the classroom level; both the classrooms and the restrooms on the same floor are wheelchair accessible. If any special services, such as a sign language interpreter, recorded notes, or specialized terminal will be needed, the prospective student should contact the training staff as early as possible to make the necessary arrangements. Such special requirements should also be noted on the training course application form. If special services will be required, contact the office of the CIT Computer Training Program as soon as possible, at least two weeks in advance. Because elevators cannot be used in case of fire, students who may need assistance negotiating the stairs should inform the CIT Computer Training Program staff before the first class.

The NIH TARGET Access Program (TAP) helps NIH employees with disabilities or special needs find the computer and electronic tools they require to be most productive. TAP allows employees to utilize the U.S. Department of Agriculture (USDA) TARGET Center, a state-of-the-art demonstration facility that features technologies designed for persons with disabilities. The TARGET Center is located at the USDA Headquarters South Building in Washington, DC, immediately adjacent to the Smithsonian Metro station. The Center is fully accessible. Appointments with the USDA TARGET Center are being coordinated by TASC.

2 REGISTRATION AND DEREGISTRATION

This section describes the procedures for user registration for the services of the OS/390 (MVS) System of the NIH Computer Center and the deregistration process.

2.1 REGISTRATION FOR SERVICES

New users are welcome at the NIH Computer Center. There are several sources of information available to help users become acquainted with the current services. The *NIH Computer Center User's Guide* gives an overview of these services, describing every aspect of the Center. Security issues are discussed in Section 4. Each newly registered user is sent an orientation package that includes a great deal of useful information on how to get started using the facility. New users are given an introductory subscription to *Interface*, the series of technical notes published for users of the NIH Computer Center. For assistance, consult the telephone listings in Section 1.3.1 of the *NIH Computer Center User's Guide.* If you are interested in becoming a user but have questions about the NIH Computer Center, the TASC staff will be glad to refer you to an appropriate person.

2.1.1 Responsibilities of Account Sponsors

Account sponsors and their designated alternates play a vital role in the success of the computer applications that are run at the NIH Computer Center. Because of this, each sponsor should designate an alternate to accept responsibility in the sponsor's absence. Sponsors and alternates must be government employees. They have full responsibility for their computer accounts. Account sponsors must ensure that all computer applications directly relate to the official government business defined in the request for use of the NIH Computer Center, and that all work adheres to the Center's published standards and procedures. Account sponsors open and close accounts, authorize and remove users under their accounts, carry out important financial responsibilities, and provide the interface between the users and the NIH Computer Center in account security and other areas. Account sponsors should refer to the manual *Procedures for Deregistration Officials and Account Sponsors*, which can be ordered from the CIT publication ordering facility (see Section 6).

Account sponsors use Web Sponsor to perform account and initials changes interactively. In order to use Web Sponsor, account sponsors and alternates must use their preferred initials. For more information on Web Sponsor, see Section 12.5. The NIH Computer Center recognizes that account sponsors play a critical role in the collaborative efforts of the users and CIT staff.

The account sponsor and the alternate should have some understanding of NIH Computer Center operations. Sponsors are urged to take advantage of the wide variety of services described in this manual. There are extensive self-study and classroom training opportunities offered by the CIT Computer Training Program (described in Section 5.2.7). Documentation is readily available via the CIT publication ordering facility (see Section 12.4). Personalized technical guidance is provided to users at no charge. The CIT Technical Assistance and Support Center (TASC) maintains the Help Desk.

CIT wants to be kept informed of problems encountered by account sponsors and would like to hear about their concerns. Submit a Service Request Ticket to communicate user problems, to request forgotten keywords, and to apply for refunds. See Section 5.2.2 for further information. Sponsors can also use electronic mail, described in Section 12.1, to communicate with CIT. Communication, of course, must always be two ways. Occasionally account sponsors will be contacted in order to update information or if a problem arises concerning the use of an account.

The CIT Technical Assistance and Support Center (TASC) serves as the central point of contact for all CIT accounts and welcomes inquiries from sponsors concerning administrative procedures.

Specific responsibilities of account sponsors include:

- registering an alternate sponsor (including preferred initials)–this person will have the authority to act whenever the account sponsor is unavailable to ensure that the work of the organization will not be disrupted
- changing the NIH Common Account Number (CAN) to which the account is charged
- authorizing additional users on an account
- working with the IC deregistration official to ensure that all registered users are current employees or contractors of the responsible IC; have appropriate, approved access; and have current information on their users records at CIT (e.g., name, address, telephone number)
- ensuring the appropriate use of federal computing resources by all users authorized on an account
- communicating with the NIH Computer Center on matters of security and privacy; reporting any suspected violation of password and keyword privacy to the NIH Computer Center's security personnel
- investigation and reactivation of initials on appropriate accounts when security investigations are completed
- ensuring that all applications and data under their accounts are appropriately protected using the security facilities provided at the NIH Computer Center
- ensuring that users are aware of their responsibilities for data security (e.g., scratching data sets) and access control (e.g., safeguarding the privacy of their passwords and keywords)
- determining when accounts are to be deactivated and insuring that all chargeable items (such as tapes, disk data sets, hardware, etc.) and initials are deleted prior to deactivation (See Section 2.2 for additional information on terminating use of services.)
- working with the deregistration official to deregister IC employees/contractors who leave NIH or transfer between ICs

- having the ultimate responsibility for user records and technical requirements needed for the "cleanup" phase of deregistration
- reminding users to change passwords and keywords frequently in order to maintain access and data security
- obtaining forgotten keywords from CIT security investigators
- resetting of RACF passwords
- reviewing the accounts and making any appropriate changes to the account information or to the names of the users authorized to use the account
- requesting Parachute service, when applicable, for users under the account

Account sponsors (and alternates) also have the ability to:

- monitor account computer resource usage through available means such as the NIH Data Warehouse, Web Sponsor, the PAS ONLINE interactive accounting system, or requesting CIT to furnish detailed transaction lists of activity on the account
- authorize orders for training materials, dedicated equipment, and tape purchases
- register and remove users for certain CIT services (e.g., Helix, ALW, Parachute, cable modem connections)
- specify a forwarding address for WYLBUR mail when requesting new user initials

2.1.2 CIT Account Numbers and Registered Initials

Anyone who wishes to use the NIH Computer Center's services must obtain a CIT account number. The appropriate account authorization forms are available from the Technical Assistance and Support Center (TASC). These forms are also used to register for an output box. The account number is a four-character combination used to access the system and for accounting purposes. Persons who are already registered users can request forms for the OS/390 (MVS) South System via Web Sponsor. Go to the SILK Locator at:

http://silk.nih.gov/locator

to learn the name and phone number of the account sponsor. (See Section 12.10.1.)

"Registered initials" (which are frequently not really the person's initials) are the identifier for an individual user. The set of initials is composed of three alphabetic characters with digits also permitted as the second or third characters. Users may find that it is convenient to obtain multiple sets of initials to facilitate management of separate projects. However, users should not share a single set of registered user initials (see Section 2.1.2.1).

Users and account sponsors are responsible for the professional use of their accounts and initials and the government facilities accessed through them. Users should be individually

registered and should not allow their initials to be used by anyone else. Use of computer time for such things as games, personal tax records, and "Snoopy" calendars is illegal; see Section 1.5 for further information.

For additional information on registering for other CIT services (e.g., Helix or ALW) refer to CIT accounts on the World Wide Web at:

http://cit.nih.gov

2.1.2.1 User Initials

In addition to the account number, each user will be registered for a set of user initials. A set of initials may be authorized to use one or more account numbers, and an account may have one or many authorized sets of initials. In general, a group of individuals should not share a set of user initials since this practice compromises the privacy of the RACF password associated with the initials.

2.1.2.2 Project Initials

Project initials permit a group of users to work together on a project, running jobs and using the same data sets without divulging their individual passwords or keywords. A set of project initials has an associated RACF password and keyword. Project initials should be used to run batch jobs with embedded passwords, since the associated RACF passwords are not subject to expiration limits. Project initials can also be used to access and store data sets, and rent tapes and disks. They cannot be used to logon to interactive systems. All online data sets that are submitted as batch jobs should have a JOB statement specifying project initials rather than user initials. See Section 4.5 for additional information on RACF.

2.1.2.3 Storage Initials

Storage initials can be used to store data sets and to rent tapes and disks. They cannot be used to logon to interactive systems or run batch jobs. A set of storage initials has an associated RACF password and keyword.

Storage initials should be used to save data that will be shared by a group of users since the passwords and keywords belonging to the individuals (which guarantee account/initials integrity) will not have to be divulged.

2.1.2.4 Public Initials

Public initials allow individuals who are not registered NIH Computer Center users to have access to specific WYLBUR and/or TSO services defined by the sponsoring organization. The public can be given access to such services as data base inquiries, status inquiry and updating, and data collection and retrieval. The NIH Computer Center has made the initials IHN on account ZPPZ available to allow anyone online access to the NIH Telephone and

Service Directory and the NIH Computer Center User Directory; for further information see Section 1.3.2.

Public initials allow any number of people to be signed on to WYLBUR at the same time. What they can do is controlled by the commands placed in the WYLBUR profile for the public initials. Once all the commands in the profile have executed, the person is logged off. Public initials cannot be used to order multiple copies of documentation. For further information on WYLBUR command procedures and profiles, refer to the WYLBUR documentation. See Section 6 for information on ordering publications.

2.1.2.5 Preferred Initials

CIT requires that accounts sponsors and deregistration officials use preferred initials to logon to interactive systems in order to carry out their official account sponsor and deregistration official tasks. When CIT sends e-mail to an account sponsor or deregistration official, the e-mail will be sent to the preferred initials. Use the SET FORWARD option of WYLBUR's ENTER MAIL command if you wish to have your mail forwarded to another e-mail address.

For Account Sponsors

Account sponsors and alternates are required to have a set of preferred initials for accessing Web Sponsor to carry out sponsor functions. Preferred initials provide the proper security for making changes to accounts as well as a means of receiving verification of account changes by electronic mail. An account official (sponsor, alternate sponsor, or deregistration official) on the same account can assign preferred initials to a sponsor or alternate sponsor through Web Sponsor. TASC can also assign a set of preferred initials to an account sponsor, or the sponsor can notify TASC, by fax or memo, to designate a set of registered initials as preferred initials.

Web Sponsor allows sponsors and alternates to make online changes to their accounts, including registering users, validating and invalidating initials, changing addresses, resetting RACF passwords, deactivating accounts, and changing the sponsor or alternate for CIT accounts. See Section 12.5 for additional information.

For Deregistration Officials

To register as a deregistration official and perform the account oversight tasks for an IC or non-NIH agencies, it is necessary to acquire a unique set of initials assigned to a valid CIT account. These initials, known as "preferred initials," should be used for online deregistration official functions. Use the Deregistration Official Authorization form to designate a set of preferred initials (see Section 2.1.4.6). Refer to Section 2.2.1 for additional information concerning the responsibilities of the deregistration officials. Refer to the manual *Procedures for Deregistration Officials and Account Sponsors*, available from the CIT publication ordering facility (see Section 6).

To perform deregistration official tasks use Web Sponsor, described in Section 12.5.

2.1.3 Output Boxes

Output from jobs printed at the central facility is placed in locked boxes located next to the Output Distribution Services counter.

CIT account authorization forms are used to register for an output box or a mailing box number for a remote location. It is not mandatory for users to register for an output box. To obtain an output box, check the request items marked "box number" and "box access code" (BAC) on the authorization form (available from Output Distribution Services) and identify the person who should be given the BAC on the registration form. The NIH Computer Center will then send the BAC to the designated person. The output boxes, located in Building 12A next to the Output Distribution Services counter, are accessed by the BAC at a keypad located by the bank of output boxes. After removing the output, the user must close the door and press on it lightly to ensure that it is latched. If there is too much output to fit in the box, an overflow box key will be put in the box telling the number of the overflow box containing the additional output. For very large volumes of output, an overflow card, for pickup from the Output Distribution Services counter, will be put in the box and must be handed in to receive the output.

There are occasions when groups of users share an output box. For example, groups of users at different locations might share an output box while collaborating on a project. Groups from remote locations could arrange for a messenger to pick up the contents of their box for delivery to their building. The messengers would need to know the BAC for the output box and would have to take care to remove only the output for their own group.

A user who forgets a BAC can go to Output Distribution Services. A staff member will open the box after checking to see that the user is registered to use the box. The user will then be given a form to complete, and the BAC will be returned by mail. BACs will not be sent to courier services, messengers, or anyone else who is not registered for the box. Registered authorized users are responsible for use and control of the BACs and must supply the BACs to their messengers. Contractors should use a box only for work related to the account under which it is registered.

There are two special output box numbers that are available for use by any user. Box 999 is the "public" box, available for any user's output; the Box Access Code for box 999 is available at the output distribution window in Building 12A. Box 000 is the "discard" box; when a job that requests Box 000 is printed at the central facility, the output of the job is discarded by operations staff members.

2.1.3.1 Boxes for Mailed Output

Users at a remote location should obtain a mailing box number (with an "M" prefix) so that output produced at the central facility can be mailed to them. Users who choose this service must accept full responsibility for delays, damage, or loss incurred in the mails and must limit the volume of output to be mailed to that which will fit in one 12 by 16 inch U.S. mail envelope (NIH Supply Number 7-7106). Box numbers are limited to 4 characters, including the M prefix.

2.1.4 Account Authorization Forms

CIT registration forms for the services provided by the NIH Computer Center are available from the Technical Assistance and Support Center (TASC). There are two CIT account authorization forms for the OS/390 (MVS) South System, one for NIH users and one for users from other government agencies. Use Web Sponsor to request these forms. When filling out these forms, it is important to check the items being requested. The CIT Technical Assistance and Support Center (TASC) can answer any questions about how to complete the forms. Refer to Section 2.1.2 for descriptions of the different types of initials.

Registration information and forms are also available on the World Wide Web. Go to:

http://cit.nih.gov

and select Accounts.

2.1.4.1 NIH Users' Form

Anyone within NIH who wishes to open a CIT account must submit an "Account Authorization" form, NIH 1767-1, to TASC. Make certain that the sponsor and authorizing official who sign the form are persons having appropriate authority within the Institute or Center (IC). The requester can be anyone who can be contacted if there are questions about the form. To authorize additional users on an account, sponsors can use Web Sponsor.

2.1.4.2 Non-NIH Users' Form

Government organizations outside the National Institutes of Health may obtain services through an interagency agreement. Requests should be directed to TASC, and should be made using the "Outside Account Authorization," NIH 1767-3.

Section D of this form requires a brief "description of services requested," describing the services and software to be used, categorizing the type of work (e.g. statistical or medical), and indicating the project's size and scope.

The form also requests an "Agency Location Code." This code is a Treasury Department number used for billing under the interagency agreement and can be obtained from your organization's financial management office.

2.1.4.3 Non-NIH Users' Annual Renewal Form

Near the end of their fiscal year, each non-NIH organization is sent an annual renewal form that must be completed. The form is entitled, "Interagency Agreement for Annual Renewal of Outside Account Authorization," NIH 1767-4.

2.1.4.4 Helix Systems Users' Forms

The Helix Systems are generally restricted to NIH use. All Helix Systems users must be registered to a CIT account for billing purposes. To open a CIT account, complete form NIH 1767-1 ("Account Authorization"), available from TASC. The "Helix User Registration" form is also available from TASC. Users must choose a username. The Helix Registration form requires the signature of the account sponsor. Account sponsors can request Helix System registration for users through Web Sponsor (see Section 12.5). When the registration is approved, an initial password will be assigned.

For information and online registration, visit:

http://helix.nih.gov/register.html

Additional Helix Registration

- A Helix Group Registration form must be filled out to establish a group on the Helix System or to add existing users to an established group.
- To register for the Biowulf system, you must already have a Helix account. In addition, there is an online registration form specifically for the Biowulf system at:

  http://helix.nih.gov/register/biowulf.html

2.1.4.5 Advanced Laboratory Workstation Forms

To register for the Advanced Laboratory Workstation system, which is limited to NIH, you must have a CIT account for billing purposes. The ALW registration forms require the signature of the account sponsor. Account sponsors can also request ALW registration for users through Web Sponsor (see Section 12.5). Contact the Technical Assistance and Support Center (TASC) for the registration package.

2.1.4.6 Deregistration Official Authorization Form

The Executive Officer (for NIH customers) or Program Official (for non-NIH customers from HHS and other Federal Government agencies) should sign the "Deregistration Official Authorization" form (NIH Form 1767-5) to assign or change the deregistration official or alternate official for CIT accounts. Deregistration officials identify their "preferred" registered initials on this form. The preferred initials must be used to carry out official deregistration functions using the Web Sponsor facility.

2.1.4.7 OS/390 (MVS) North System Forms

Forms for registering for the OS/390 (MVS) North System are available through TASC. These include the "North System Individual Registration" form and the "North System Billing Code Authorization" form.

2.1.5 Updating Registration Information

Because it is frequently necessary for the CIT staff to contact users, the address and telephone number list must be kept current. Users can correct their addresses and phone numbers through Web Sponsor or by sending in the "Information Change Notice," NIH 1767-2. Copies of this form are available TASC and can be mailed or faxed upon request.

Web Sponsor allows account sponsors (and alternate account sponsors) to change CIT account information. In order to update account information using Web Sponsor, sponsors must provide their preferred initials. Web Sponsor allows sponsors or alternate sponsors to register users; reset passwords for users on the account, validate or invalidate initials; update addresses, output box numbers, and telephone numbers for users on their accounts; deactivate accounts; and change the sponsor or alternate for a CIT account. The requested change does not take place immediately; rather, it is reviewed by CIT for validation and possible correction before it is entered into the Computer Center User Registry System. Once the change has been approved and processed, confirmation will be sent to the requester by electronic mail (for users of Web Sponsor) or hardcopy (for users of the NIH 1767-2). For more information on Web Sponsor, see Section 12.5.

If a user is causing systems problems and cannot be located by CIT staff, those initials will be made unusable until contact is made.

2.2 DEREGISTRATION FROM SERVICES

This section describes the procedures for terminating the use of CIT services for users who are no longer authorized to access the central facilities. The account sponsor and the deregistration official each play an important role in this process. Refer also to Section 2.1.1.

2.2.1 Responsibilities of Deregistration Officials

A deregistration official is appointed by the IC Executive Officer or the responsible agency official. The deregistration official is ultimately responsible for ensuring that access to financial systems (e.g., databases on the OS/390-MVS System) is denied when an employee resigns or is transferred to another IC or government agency. Since the deregistration official is responsible for some issues regarding funds, security, and privacy with respect to the NIH Computer Center, the deregistration official should always be a government employee.

An alternate deregistration official must be assigned. This will be most beneficial in the deregistration process when the primary deregistration official is not accessible.

Deregistration officials can use Web Sponsor to help them carry out their responsibilities. See Section 12.5. Specific responsibilities of the deregistration official include:

- taking total oversight of the deregistration of users from their account(s)
- resetting RACF passwords when users leave the IC or agency
- acknowledging new accounts (for accountability purposes only)

- assigning a formal backup deregistration official

For more information, refer to the manual *Procedures for Deregistration Officials and Account Sponsors*, available from the CIT publication ordering facility (see Section 6).

2.2.2 Terminating Use of Services

To close an account, the account sponsor should use Web Sponsor or, if necessary, submit an "Information Change Notice" to the Technical Assistance and Support Center (TASC). The Web Sponsor facility has streamlined many of the tasks necessary to close an account or remove a user from an account. Closing an account can only take place after all of the requirements listed below have been met.

When an account or a set of initials under an account is to be canceled, the account sponsor needs to ensure that all computing resource usage has ceased prior to the cancellation. The account/initials should no longer own data sets (public disk, MSS, migrated, or dedicated disk) or tapes at the time of cancellation. Data sets and tapes that contain important or useful data should be transferred to another set of registered initials, and all unneeded data sets should be scratched and unneeded tapes released. DB2 code and tables must also be renamed or transferred. The specific steps required to perform this reassignment/release of data and resources are as follows:

- Use the WYLBUR command SHOW DSNAMES BOTH to provide a listing of all the current and migrated data sets belonging to the user. See Section 13.1.5 for information on older migrated data sets. If someone other than the user makes this request, the command takes the form

  SHOW DSNAMES LIKE &aaaaiii BOTH

- The keyword associated with the user's initials must be provided at the next WYLBUR prompt. For additional information on the SHOW DSNAMES command, see Section 13.6. If the sponsor logs on with the user's account/initials combination and password, no keyword is required.
- Rename all data sets that are still of active use to the organization. Reassign them to valid initials and account numbers using WYLBUR's RENAME command, the RENAME option of WYLBUR's SHOW DSNAMES command, or TSO's RENAME command. The PAST option of WYLBUR's RENAME command should be used for renaming migrated data sets. The DSRENAME batch procedure is described in the manual *Batch Processing and Utilities at the NIH Computer Center*.
- After all useful data sets have been reassigned, any remaining current or migrated data sets must be deleted. WYLBUR's SCRATCH command, the TSO DELETE command, or the DSSCR procedure can be used to delete the unwanted FILE or TMP data sets on public volumes; DSSCR must be used for MSS data sets. Migrated data sets can be scratched only with the PAST option of WYLBUR's SCRATCH command. The

WYLBUR command

```
SHOW DSNAMES LIKE &aaaaiii. PAST SCRATCH MULTIPLE
```

provides a convenient way to delete all remaining migrated data sets.

- The ADSMAP batch procedure duplicates the functions of WYLBUR's SHOW DSNAMES CURRENT command producing a report providing information about a user's data sets including MSS data sets. Release all dedicated disks by sending a memorandum, signed by the account sponsor, to TASC, indicating the volume number of the disk and the date it is to be released. Use the VOLSTAT batch procedure, described in the manual *Batch Processing and Utilities at the NIH Computer Center*, to list the user's tapes being stored at the NIH Computer Center. The ASSIGN option of this procedure will reassign tapes to a new owner. The RELEASE option will release any unnecessary tapes.
- DB2 users should get into DB2's Query Management Facility (QMF) and at the "COMMAND===>" type the RUN DB2.TABLES command. The command output will display all the tablespace names of the tables stored under the account/initials used to logon to DB2. The user would then give the DROP command in QMF to drop those tablespaces that contain tables no longer needed. For information on DB2, refer to:

  http://silk.nih.gov/dbtech

- Cancel subscriptions to Internet listserv lists.
- If the person who has acted as the contact point for dedicated hardware leaves, the name of the new contact must be sent to TASC.
- If equipment rented from the NIH Computer Center will no longer be used, submit a memo to:

  Technical Assistance and Support Center
  Center for Information Technology
  National Institutes of Health
  Building 12A, Room 1011
  12 South Dr. MSC 5605
  Bethesda, MD 20892-5605

The initials and account numbers will be invalidated when the cleanup is complete. When the request for invalidation is received, a check will be made by the deregistration official to determine if services are still being provided to the user or the account number. Closure will take place only when the cleanup is verified.

An alternative to canceling account/initials as described above is to reassign the account/initials to another user in the office. In this way, the initials are placed under the control of another employee without having to reassign or release any data sets and tapes. Typically the transferred account/initials would be designated as "project" or "storage"

initials (see Section 2.1.2 for a description of project and storage initials). When using this approach, the account sponsor should ensure that the resources used by the reassigned initials are closely monitored and minimized. Contact the CIT Technical Assistance and Support Center (TASC) if there are any questions concerning the reassignment of initials or the deregistration procedure.

3 CHARGING

A schedule of rates governing the various kinds of services offered by CIT has been established under the NIH Service and Supply Fund (Revolving Fund). For billing purposes, each customer-defined project is identified by a four-character CIT account. This account number must be used on all requests for services, as well as on every JOB statement and at the beginning of every terminal session. In addition, everyone who personally uses any computer services must obtain a set of initials (e.g., public or registered) that have been validated with one or more CIT accounts. Users of data processing facilities are billed monthly. For conditions under which refunds will be made, see Section 3.10.

3.1 BATCH CHARGING FORMULA

The NIH Computer Center charges for the use of its central facilities at a rate of $.185 per machine unit with a minimum charge of $.25 per job. CPU charges are based on CMOS seconds (Model 9672). This charge is computed in the following way:

MU = 3.46*C*(.00020*R+1) + .00017*I + M*T

where

MU = machine units
C = CPU time, 9672 CMOS machine (in seconds)
R = region used (in 1K bytes) up to 1536K
I = I/O used
M = tape mount factor—used to normalize the charge to $1 per mount
    4.7619 for non-discount jobs
    11.90475 for discount jobs
T = number of mounts for assigned and special tapes

The tape mount factor ("M" in the charging formula) is designed to result in a charge of $1.00 for each tape (assigned or special) mounted in the job, including jobs run during the discount time period.

The I/O is the sum of the number of blocks read and written from tape and disk data sets, the number of card images read, and the number of lines and card images spooled for output.

Setting a tape to "used" during the VOLSTAT procedure results in a charge of $1.00.

If a batch job causes lines to be printed at the central facility, it will incur additional charges as detailed in Section 3.5.

3.2 DISCOUNT PROCESSING

Discount service offers a 60% rate reduction for all jobs started between the hours of 5:00 p.m. and 7:00 a.m. Monday through Friday and all day on weekends. Federal holidays are treated the same as weekdays. However, the minimum charge per job is still $.25. Discounts are applicable to most WYLBUR LIST OFFLINE and TSO LISTOFF commands only if they are submitted during the discount period. No discount is offered on off-line output services such as microfiche. There is no discount rate for interactive DB2 access or for tape mounting. Batch processing during the discount period is requested by including the /*DISCOUNT statement in the job or by using the DISCOUNT option of WYLBUR's RUN command. Only jobs (including class C) that explicitly request discount processing will be assured of starting during the discount time period. The charge for tapes mounted (M in the machine unit algorithm for batch jobs shown in Section 3.1) is not discounted.

Charges for interactive terminal systems are reduced by 60% during the discount period. The charge for any terminal session which crosses the boundary of the discount period will be prorated so the discount is given for work done during the discount period. For further information, see "/*DISCOUNT" in the manual *Batch Processing and Utilities at the NIH Computer Center*.

3.3 INTERACTIVE TERMINAL SYSTEMS

The costs for using interactive terminal systems are displayed at the user's screen at the end of each session when normal logoff procedures are followed. During the discount period, charges for interactive sessions are reduced; see Section 3.2 for details.

Figure 3-1. Charging for Interactive Terminal Sessions

Service	Charge
WYLBUR Terminal Session	
Editing Time (CPU time used during a session)	$.33 per second
Connect time	$1.00 per hour
TSO (Time Sharing Option)	
Terminal Session	$.30 per CPU second
Connect time	$.90 per hour
IMS (a restricted access system that runs under TSO)	
Transaction per account/initials combination per day	CPU SECONDS * CPU FACTOR * CHARGE PER MU + SURCHARGE $1.29 per CPU second $0.05 surcharge per transaction

> **Note:** WYLBUR editing time is displayed in 3090-300J CPU seconds.
>
> TSO terminal session time is displayed in CMOS (Model 9672) seconds. TSO terminal session charges are based on 3090-300J CPU seconds (2.2 times a CMOS second).

3.3.1 Relational Database Environment (DB2)

Costs for relational database management systems use on the OS/390 (MVS) Enterprise System are as follows:

Interactive Charges

These charges consist of connect time charges, interactive charges for SQL, and other CPU charges.

- Connect time charges
  - $.90 per hour connect time for TSO access (displayed at logoff)
  - $1.00 per hour connect time for client/server access
  - connect time during the SQL execution period (this depends on the application)
  - connect time for Web access via SILK as determined by the SQL execution time

In the relational database environment, SQL charges are separate from other CPU charges. The SQL charges are accumulated for the day and charged at a reduced rate as follows:

- Interactive CPU time charges for SQL

  SQL CPU time for interactive usage and Web access is accumulated for a day by account/initials. The total CPU time for the day is multiplied by the speed factor (2.2) for the CMOS machine. This factored CPU time is charged on a sliding scale as follows:

0+ to 10 CPU seconds	$.30 per CPU second
10+ to 25 CPU seconds	$.22 per CPU second
25+ to 200 CPU seconds	$.10 per CPU second
200+ CPU seconds	$.05 per CPU second

  The charges displayed at logoff from a TSO/relational database session are those incurred for TSO CPU time used in the session and connect time for the TSO session. The PAS (Project Accounting System) monthly bill displays a separate charge for SQL interactive access. The daily charge consists of SQL CPU costs and connect time for client/server access.

  There is no discount rate for interactive relational database system SQL access.

- Other CPU Time

  Charged at the TSO rate

Batch Charges
See Section 3.1 for the rate for all batch processing, including SQL.

Oracle Usage Rights Charges
CIT customers can purchase usage rights to an Oracle Concurrent User Network site license. The agreement covers the Tru64 UNIX, Pyramid, Sun Solaris, and Microsoft NT Platforms. The site license provides server software—that includes Enterprise Oracle Server, Distributed Option, Parallel Query Option, Advanced Replication Option, and SQL*Net—and the Oracle text search tool, ConText, for any of the above platforms.

Figure 3-2. Charging for Oracle Usage Rights

Service	Charge
Concurrent User Right	**One-time Fee**
50 or more users	$1,706 each
5 to 49 users	$1,770 each
fewer than 5	$1,948 each
Maintenance	**Monthly fee**
50 or more users	$20.92 each *
5 to 49 users	$21.58 each *
fewer than 5	$23.67 each *

* Maintenance fees will increase by 3% on January 1 of each year. Prices quoted are effective January 1, 2000.

Oracle's Point-of-Contact support, a relatively high-priced Oracle service, can also be purchased from CIT. Contact TASC for costs and more information.

3.4 DATA STORAGE SERVICES

Disk

The charges for public online disk space include associated services (e.g., backup and recovery, 7 x 24 monitoring, etc.) and are computed on a seven-day week.

Figure 3-3. Public Online Disk Space Charges

Service	Charge
FILE*, TMP, and MSS data sets on public RAMAC devices	$.011 per megabyte per day, based on maximum capacity of allocated disk space
Creating a backup of a FILE data set	$.00025 per track one-time charge
Data sets migrated before the implementation of HSM on 4/18/94	$.00075 per track per day

* Not applicable to datasets named aaaaiii@wylbur.mail.

The cost of storing a track of data (about 50K) on a public disk for a year is 20 cents. The maximum additional cost for backing up a one-track FILE data set is 8 cents (if the data set is modified and backed up every day).

Dedicated Disk

Figure 3-4. Dedicated Disk Charges

Service	Charge
Dedicated RAMAC disk	$2,050 per month (or partial month)

Tape

The tape charges are as follows:

Figure 3-5. Tape Charges

Service	Charge
Having an assigned tape	$1.00 per month (or partial month)
Permanently removing a tape from the library	$15.00 for 3480 and 3490E cartridges, and 9 track tape
Marking a tape as "used" by the VOLSTAT procedure	$1.00 per tape

3.5 OFFLINE OUTPUT SERVICES

Printing

The charge for printing at the central computer facility is

$1.00 per 1000 lines printed

The same printing charges are incurred by jobs printed on remote printers supported by the NIH Computer Center (e.g., Remote 8). For each piece of output (enclosed with a header and trailer sheet) there is a minimum charge of $1.00. The discount rate applies if the job which creates the output is discounted, even if the printing takes place during non-discount hours (i.e., after being placed in output hold).

For APA (all points addressable) "page mode" printing on the laser printers at the central facility, the charge is $.05 per page. APA printing is used for printing graphic images on the laser printers.

Microfiche

Figure 3-6. Microfiche Charges

Service	Charge
original fiche (shot at 42x reduction)	$1.60 per original fiche
duplicates (must be made at the same time as the original)	$ .25 each
minimum charge for microfiche	$2.50

3.6 NIH BACKUP AND RECOVERY SERVICE (NBARS)

Charges for the NIH Backup and Recovery Service (NBARS) for distributed data are determined by the amount of data transferred to/from the server during the month and the average number of file images stored on that server during the month.

Figure 3-7. NBARS Charges

Service	Charge
File storage	$.00075 per file per month
Data transferred over the network	
Data transferred by a node in a month	
Up to 1 gigabyte	$15.00 per gigabyte
Over 1 gigabyte	$7.50 per gigabyte
Minimum transfer charge	$3.00 per node

3.7 SILK WEB SERVICES

The charges for using the SILK (Secure Internet-LinKed) Web Technology depend on the type of SILK server.

3.7.1 Public and Secure Servers

The charges for public and secure SILK servers are as follows:

Figure 3-8. Public and Secure SILK Server Charges

Service	Charge
unlimited number of Web pages ("@WWW" data sets) stored under an account/initials combination	$20.00 per month **and** normal data set storage charges (Section 3.4)

3.7.2 Customized Servers

The monthly fees are determined by the actual level of service provided to your server. The charges are based on the amount of data stored on your server and the amount of data your server sends to browsers. In addition, there is a one-time set up fee of $50.

There are three rates of service—basic, intermediate, and advanced. The charges are as follows:

Figure 3-9. Customized SILK Servers Charges

Level of Service	Monthly Cost of Customized Servers				
	Maximum		Server Fee	Optional Security Fee[3]	Total Cost
Basic	storage	10 MB [1]	$ 60	$ 10	$ 60 - 70
	traffic	500MB[2]			
Intermediate	storage	25 MB[1]	$ 100	$ 15	$ 100 - 115
	traffic	1000 MB[2]			
Advanced	storage	50 MB[1]	$ 200	$ 20	$ 200 - 220
	traffic	2000 MB[2]			

1 Storage: Levels above the maximum will incur an additional $1 for each 1 MB *or fraction* of data stored. For example with intermediate service, 26.5 MB of data stored will cost $2 extra—or a total of $ 102 ($100 + $2), assuming traffic does not exceed the maximum. If traffic goes above the maximum, it will be charged extra.
2 Traffic: Levels above the maximum will incur an additional $1 for each 10 MB *or fraction* of data transferred. For example with basic service, 525 MB of data transferred will cost $3 extra—or a total of $ 63 ($60 + $3), assuming storage does not exceed the maximum. If storage goes above the maximum, it will be charged extra.
3 This charge is assessed if the server uses either the "designated users" security feature or the "group" password facility because both require monitoring. There will be no monthly security fee for servers created with "unrestricted" or "registered users" security.

3.8 RJE WORKSTATION EQUIPMENT

The NIH Computer Center passes through only the direct charges it incurs for RJE equipment and maintenance. On rare occasions, if a vendor's charges change without advance notice, such unannounced changes must be passed on to users.

Figure 3-10. RJE Workstation Port Rental Costs

Service	Charge
Workstation Equipment Dialup port Installation fee	Monthly Rental $5.00 per hour of connect time $100.00
Dedicated port Installation fee	Cost of line to CIT $100.00
Line and 2 modems	Rates vary depending on line speed and distance from NIH

3.9 BILLING INFORMATION

CIT has implemented several methods by which the user can keep track of all user charges as they accumulate:

- The charge for each job step of every job run in the batch is printed on the job output. (Sample job output is included in the manual *Batch Processing and Utilities at the NIH Computer Center*.)
- Customers using the OS/390 (MVS) South System can review their bills for CIT services on the NIH Data Warehouse via Data Town at:

  http://www-dw.cit.nih.gov/dw/datatown.htm

  Choose "DW Utilities" and then select "CIT Web Billing System."
- Account sponsors can view account bills using the NIH Data Warehouse or through Web Sponsor. (See Section 12.5.)
- The charges for each terminal session in WYLBUR and TSO are printed at the end of the session, unless you logged on with public initials.
- Data storage costs can be identified by using the VOLSTAT and ADSMAP procedures. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*. DB2 users should get into QMF to RUN DB2.TABLES to ascertain DB2 disk usage.
- The user may obtain a copy of the past month's bill by running PASBILL, which is described in the manual *Batch Processing and Utilities at the NIH Computer Center*.
- A very detailed report, which includes records of every transaction against an account for a month can be obtained with the account sponsor's approval. The charge for obtaining the report, which depends on the number of transactions, will be billed to the user's account. For further information, contact the CIT Technical Assistance and Support Center (TASC).

- The PAS ONLINE system provides an interactive method of obtaining summary billing information for a full year for user accounts. See Section 3.9.1 for further information.

3.9.1 PAS ONLINE

The interactive accounting information system, PAS (Project Accounting System) ONLINE, displays summary reports based on charge records for a full year for account sponsors and users. The system is accessed through DB2.

PAS ONLINE is a full-screen (3270-type) application consisting of QMF (Query Management Facility) procedures that produce billing reports. In order to run any or all of the procedures, the user needs to log onto DB2 and select the QMF option from the DB2 Main Menu Panel. For specifics on how to log onto DB2, see the NIH DB2 documentation on the Web. (See Figure 11-1.) Once in QMF, at the "Command===>" prompt type RUN followed by one of these procedure names:

PROCEDURE NAME	FUNCTION
PAS.INIT_MONTHSUM	Displays a summary of the charges incurred by the user for the month requested
PAS.INIT_MONTH	Displays all charge records generated by the user for the requested month
PAS.INIT_DATE	Displays all charge records generated by the user for the requested date
PAS.ACCT_MONTHSUM	Displays a summary of the charges incurred by one of the sponsor's accounts broken down by initials under that account
PAS.ACCT_MONTHBILL	Displays all charge records for one of the sponsor's accounts for the requested month
PAS.ACCT_INITMONTH	Displays all charge records for one month by one set of initials under one of the sponsor's accounts
PAS.ACCT_INITDATE	Displays all charge records for a specific date for one set of initials under the sponsor's account
PAS.ACCT_OWNER	Displays all accounts for which the person signed on is sponsor

The procedures whose names start with PAS.INIT_ are intended for individual users, while those that start PAS.ACCT_ are designed for account sponsors.

Account sponsors are encouraged to monitor the computer resource usage associated with their accounts via PAS ONLINE. An account sponsor would typically run PAS.ACCT_MONTHSUM to see the charges incurred by an account for the current or previous full month, and then, if questions arise, run one of the other procedures to get more detailed information. Also, account sponsors can run the procedure PAS.ACCT_OWNER to get a list of all their accounts.

The data security features of DB2 make available all the records each user and each account sponsor are entitled to see, while maintaining the security of the charging information in the PAS data base.

3.10 REFUND POLICY

If a job aborts due to operator error, hardware failure, or system software failure (not the user's application program), the user may request a refund of computer costs directly associated with the failure. See Section 5.2.2.3 for directions on requesting a refund. To avoid problems, users should become familiar with the standards for running batch jobs at the NIH Computer Center. Refer to Section 10 for this information.

To qualify for a refund due to a failure attributable to the NIH Computer Center, the following conditions must apply:

- All evidence necessary for investigation of the problem (such as source code, tapes, disks, and all data sets), must be preserved unchanged.
- Refund requests must be received within 5 working days after the failure occurred.
- The refund request must be for at least $10.00, but you may collect resolved Service Request Tickets for which refunds were denied because they were less than $10.00 and submit a Service Request Ticket requesting a refund for the accumulated batch whenever they total $10.00 or more.
- Errors in software not supported by the NIH Computer Center are not eligible for refunds.
- If a terminal session or batch job is ended because the system crashes, no charge is made; so no refund is necessary.
- The job cannot violate installation standards, even if it fails because of operator error, hardware failure, or a failure of system software.
- All Class C jobs should be restartable. If a Class C job aborts and has no step restarts, a refund will be made only for the step that aborted. For a very large step, the maximum refund will be for one hour of processing (job step charges/elapsed hours).
- Users are responsible for determining reasonable CPU time requests for their jobs. A Class C job which runs for the maximum time limit may cost thousands of dollars. Even

if a system error causes the problem, no refund will be given for a looping program which results in a 322 ABEND unless a reasonable attempt has been made to estimate CPU time accurately.

- Unless a pre-assigned tape was used, the CIT must be notified of any refund request for off-line processing (e.g., Micro) before the tape is recycled. This is necessary since scratch tapes mounted for off-line output are kept for no more than 24 hours after processing. The user may submit the Service Request Ticket to ensure prompt delivery or call the TASC staff to notify them of the problem. See Section 5.2.2.1 for information on submitting a Service Request Ticket.
- Be certain that a job runs successfully before other jobs that are dependent on it are allowed to run. (DSSUBMIT can be used to accomplish this; refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.) If a job fails to run because it was dependent on another job which did not run successfully, a refund cannot be made. This applies even if the original job failed because of a system or operator error.
- Jobs that have interdependent steps must have condition code testing. The maximum refund allowed in case of a system or operator error is for the step that terminated abnormally and a setup step or two.
- Refunds will be given only for the original error and one retry. (Do not submit a command or run a job repeatedly hoping that the problem will disappear.) If a refund is requested because a job failed but the rerun (with no changes) was successful, the documentation from both runs must be submitted to justify the refund.
- A job that specifies a message level that causes messages to be suppressed (e.g., MSGLEVEL=(0,0)) is not eligible for a refund.
- A job that failed because it depended on a particular output format from a Computer Center utility is not eligible for a refund.
- The job must not have failed because of I/O errors encountered when using a "special" tape (one not owned by the NIH Computer Center).
- The NIH Computer Center may choose to rerun a job at its own expense after correcting or bypassing the problem which caused the original job to fail. When this is done, no refund will be given.
- Looping TSO or WYLBUR sessions with SESSION COST WARNINGs turned off or decreased in frequency are not eligible for a refund.
- Users should monitor their use of data storage on a regular basis. Refunds for excessive storage costs can be granted only for a reasonable period of time even if caused by system problems.
- Programs which are debugged and running on a production basis should include a //SYSUDUMP or //SYSABEND statement because many errors which occur can be diagnosed only with a dump. If the job runs properly, the dump statement costs nothing, but if it fails, a dump may be needed to find the problem and give a refund.

3.11 REDUCING COSTS

Assisting users to make the most efficient and effective use of its facilities is an important concern of CIT. Cost saving hints are given throughout this guide and other publications provided to users. This section collects a body of those suggestions to enable users and their managers to review their applications collectively to increase savings.

The first step in cost control is to examine where expenditures occur. Use the NIH Data Warehouse facility on the Web to review charges. See Section 3.9 for more information. A copy of the most recent month's bill can be obtained by running the PASBILL procedure described in the manual *Batch Processing and Utilities at the NIH Computer Center*. Since the information in the monthly bill is not broken down by initials, it may be most useful when a limited number of employees use one account. The PAS ONLINE interactive accounting information system, described in Section 3.9.1, allows users and account sponsors to easily monitor costs. Other methods of examining expenditures are described in Section 3.9.

Batch Processing

In addition to the hints below, the documentation for individual languages and procedures often contains additional cost-saving recommendations. To reduce the costs of batch processing try the following:

- Jobs run during the discount period (evenings and weekends) obtain dramatic savings; see Section 3.2 for specific rates and hours.
- For applications that require the use of tapes, it may be possible to reduce the number of tape mounts required by some jobs. If a tape is to be used more than once in a step or in multiple steps, proper JCL can minimize the number of times the tape has to be mounted, and therefore, the corresponding tape mount charges. Use the JCL subparameter RETAIN in the VOLUME parameter and the PASS subparameter of the DISP parameter to ensure, where possible, that a tape remains mounted during and between steps.
- Programs that are run repeatedly should execute a fully or partially resolved load module rather than being compiled each time. For COBOL, FORTRAN, and PL/I, compiler optimization options can provide additional savings.
- Reblocking files can reduce I/O costs. Small blocksizes increase I/O counts. Recommended blocksizes are given in the manual *Batch Processing and Utilities at the NIH Computer Center*.

Terminal Sessions
As with batch processing, an effective way to save money is to use the system during the discount period. Additionally:

- SESSION COST WARNING messages in WYLBUR, TSO, and DB2 help users be aware of the costs they are incurring. They can be particularly useful when a WYLBUR command procedure or a TSO program encounters a loop. The messages alert the user to the problem before substantial charges accumulate. The time intervals for these warning messages can be adjusted depending on how carefully the user wishes to monitor CPU time usage. No refunds can be given for sessions that run up large costs with the warning messages turned off.
- In WYLBUR, if several large files will be accessed repeatedly during a session, it is less expensive to keep them as active files than to USE and RESAVE them repeatedly during the session. Of course, any files that have been changed should be resaved before logging off.
- Using WYLBUR effectively can save time as well as money. Command procedures can be used to automate routine and time consuming tasks; a WYLBUR profile can be set up to perform WYLBUR commands and functions automatically when the user signs on, and SET commands can be used to reduce complex commands to a few keystrokes.
- WYLBUR command procedures that will be used repeatedly can be precompiled. This improves initial response time for the user and reduces costs. See the *WYLBUR Command Procedures* manual for hints on efficient coding of command procedures.
- In WYLBUR, when giving a command that will search a large file, reduce the number of lines to be searched when possible. For example, give a range of lines rather than "IN ALL" for a CHANGE command or specify the "1st" occurrence of a string if it only appears once.
- WYLBUR can be run as a batch job to automate routine tasks; the batch job can be run during the discount period for substantial savings.
- Review the charges at the end of a session to see if they seem reasonable. The charges should be equitable for the work performed. If they are unreasonably large, contact the TASC staff to see how they may be reduced. Doing this promptly, while you remember and, if necessary, can re-create what you were doing is far more satisfactory than trying to discover a problem after the bills have come in.
- Users can cut costs by storing data economically.
- Data sets that are no longer of value should be scratched using WYLBUR's SCRATCH command. Migrated data sets can be scratched using the PAST option of WYLBUR's SCRATCH command.

> Data sets created, restored, or retrieved after April 18, 1994 are not migrated, but are automatically moved to appropriate storage media by HSM.

- Partitioned Data Sets (PDSs) can be condensed using the RELEASE option with the space allocation.
- Use MSS (Managed Storage System) for data sets that do not require Computer Center backup.
- Dedicated (private) disks cost more to use than public direct access storage facilities. Consider your storage requirements carefully before requesting use of a dedicated disk.
- Users should examine their tape usage to determine if some data should be stored on disk. The convenience, automatic backup, and low disk charges often make disk an attractive alternative to tape.

Network Services

- Use the NIH Backup and Recovery Service (NBARS) to backup only the files on your workstation that contain critical data.

4 SECURITY AND DISASTER RECOVERY

Computer security is a vital concern at NIH. The Center for Information Technology follows the guidelines set forth in the Department of Health and Human Services *Automated Information Systems Security Program Handbook,* which can be found at:

http://wwwoirm.nih.gov/policy/aissp.html

The NIH Computer Center Enterprise Systems have been developed to meet the requirements for Level 3 security. (This designation refers to systems that handle data with high sensitivity and highly critical applications.) The NIH Computer Center is subject to an annual SAS70 audit by an independent auditing firm. While CIT is responsible for providing computing tools within a secure system, it is up to individual users to ensure that their own data and applications are protected. The NIH Computer Center maintains physical security procedures to protect data (including financial transactions) from improper access by unauthorized individuals and performs disaster recovery exercises to ensure that vital data can be reclaimed if the NIH Computer Center is disabled by a major catastrophe. Each user, account sponsor, and deregistration official has a clear role in maintaining a responsible level of computing security. Users and sponsors are expected to take routine precautions to safeguard the privacy of their passwords and keywords, and to report any suspected violations of this privacy to the NIH Computer Center's security personnel. Many of these topics are discussed in the CIT Computer Training Program seminars on security and managing data. Additionally, users and account sponsors are responsible for using the appropriate security facilities provided by CIT. These include such the use of IBM's Resource Access Control Facility (RACF) and encryption procedures (see the manual *Batch Processing and Utilities at the NIH Computer Center*) to protect their sensitive data and applications.

Several laws and regulations require that Federal Agencies that collect information about individuals ensure that it is disclosed only to authorized individuals and agencies; that it is accurate, relevant, up-to-date, and complete; and that its integrity is protected. The applicable laws and regulations include:

- Computer Security Act of 1987, P.L. 100-235 (1988)
- Privacy Act of 1974, P.L. 93-579, 5 U.S.C. 552a (1974)
- Public Information Agency Rules, Opinions, Records, and Proceedings (Freedom of Information Act), 5 U.S.C. 552 (1967)
- OMB Circular A-130, "Management of Federal Information Resources, Appendix III, Security of Federal Automated Systems," December 12, 1985

HHS Information Resources Management (IRM) policy requires computer facilities to provide access control software to users for protection against unauthorized access and use of data. The NIH Computer Center supports RACF to allow users to maintain data and access security. RACF registration is automatic; additional data set protection is available through

Web RACF (http://silk.nih.gov/racf). The CIT Computer Training Program offers instruction on the use of RACF.

The NIH Computer Center has a formal disaster recovery plan and has procured the availability of an alternative recovery facility and services for critical applications. The CIT Computer Training Program offers instruction on designing disaster recovery plans for critical applications.

Security includes routine measures to protect data from improper access by unauthorized individuals. Data security is the responsibility of users who create and maintain personal data systems. However, the NIH Computer Center offers facilities to help maintain data and access security. The deregistration procedures help to ensure a safe computing environment upon the termination of services for an employee or contractor. See Section 2.2 for additional information on deregistration procedures.

Uninterruptible Power Supply (UPS)
The single greatest cause of computer disasters, nationwide is loss of electrical power over a relatively long period of time. The Computer Center has an uninterruptible power supply (UPS) for use on the centralized computing, data storage, and communications facilities managed by the Center. The UPS should eliminate virtually all power interruptions, such as those caused by sudden surges or drops in power, or violent weather conditions.

The UPS system is designed to provide all electrical service to Building 12—the heart of the NIH Computer Center that houses the hubs and routers of the NIHnet, the enterprise servers supporting NIH, supercomputers, and the main facilities of the ALW service.

4.1 PASSWORD AND KEYWORD USE AND PROTECTION

Protect your account; change your password and keyword frequently. In setting your password, consider these guidelines:

- Don't write your password down and leave it near your workstation.
- Passwords should not be the same as login names or account/initials combinations.
- Use a "mnemonic" password (take a favorite saying or phrase and use the first letter of each word to create the password).
- Do not use passwords with personal associations (e.g., phone numbers, license plates, proper names)
- Devise passwords/keywords that consist of both letters and numbers; take advantage of national characters and embed them in your password.
- Don't use obvious sequences, such as simple keyboard strings (or any of these spelled backwards).
- Avoid sharing your password and keyword with others. "Sharing" passwords and keywords undermines security, possibly resulting in unauthorized access to government

computing resources or sensitive data. Even though Computer Center output does not divulge any password or keyword information, security can be compromised over time in subtle ways (e.g., by emulation software that cannot mask passwords that are entered when signing on to a system).

- Use emulator software that provides print suppression capability in order to mask (or not display) the password typed during logon. Print suppression plays a vital role in practicing good security procedures. Kermit (supported for the PC) has the capability to mask passwords. If the emulation software that you have chosen does not provide print suppression capability, it is imperative that you take additional precautions when entering your password.

Be particularly cautious about revealing your password or keyword to someone on the telephone. CIT staff never call users requesting their password s or keywords unless it is with regard to a specific problem that has been reported or in direct response to a user telephone call. If a staff member must initiate a contact and request a password or a keyword (for example, to fetch a batch job that is causing system problems), users should ask for the staffer's name and call back through the Technical Assistance and Support Center (TASC) before fulfilling the request. This will ensure the identity of the staff member and prevent unauthorized persons from misidentifying themselves as systems personnel.

Change your password frequently. RACF passwords can be changed through the RACF facility using Web RACF. Open your Web browser to:

http://silk.nih.gov/racf

and select Change RACF Password. For more information, see Section 4.5.2.

Keywords can be changed via WYLBUR's SET KEYWORD command using WYLBUR, either interactively or in a batch job (refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.) For further information, see the *WYLBUR Fundamentals* or *WYLBUR General Editing* manuals.

When a user is prompted for a password or keyword, it is possible that a simple typing error could generate an "INCORRECT RACF PASSWORD (RECORDED IN SECURITY LOG)" message. While typing errors are to be occasionally expected, the user should stop attempting to supply the password or keyword after 2 or 3 tries and contact the account sponsor. Repeated errors in attempting to supply a password or keyword are logged by the NIH Computer Center as a security violation, and the NIH Computer Center will suspend use of the affected account/initials until the account sponsor makes a formal response to the violation notification. For further information on security violation procedures, see Section 4.4.1.

4.2 NORMAL PHYSICAL SECURITY PROCEDURES

To meet the responsibilities summarized in the *Automated Information Systems Security Program (AISSP) Handbook* (which includes the Privacy Act of 1974 and the Computer Security Act of 1987) and to protect the information systems and the data in its systems, the NIH Computer Center restricts physical access to its computer machine rooms and output handling areas.

Access to the Building 12 complex (Buildings 12, 12A, and 12B) is limited. A security guard is stationed at the main entrance of the complex, the west door to Building 12A (at the breezeway to Building 12B), 24 hours a day, seven days a week. Anyone entering the building must display a valid government ID, or register with the security guard, showing a current photo identification, to acquire a temporary visitor's badge. To enter the east side of Building 12A, Building 12 and Building 12B (except for the public cafeteria and concession stand), you must have a cardkey.

The restricted areas include the Enterprise Systems and Helix Systems machine rooms and the output distribution area. Anyone in these areas must have an authorized identification badge. There are several types of badges:

- Regular entry badges are given to Computer Center employees who have a recurring need to enter the restricted area.
- Temporary access badges, which permit short-term entry to equipment installers, repairmen, visitors, etc., are issued by the Chief, Systems Operations Management Branch.
- Escort badges allow temporary access for persons who will be accompanied while in the building (e.g., students on a machine room tour).

The operations staff will ask anyone not identified in one of the above ways to leave the computer room and will call the NIH police if a visitor does not comply with this request.

Output generated at the central facility is placed in locked boxes that can be accessed only by users knowing the correct box access code (BAC). Further details are given in Section 2.1.3.

To ensure the physical security of tapes, the NIH Computer Center requires that the sponsor of an account authorize the permanent removal (purchase) of any tape from the Information Media Library. (See *Using Tapes at NIH*.)

When tapes are taken out of the Information Media Library for any reason, the person receiving the tapes must provide the following information to the Production Unit staff: name (and signature), ID badge number, drivers' license number and state, IC or company name, and company phone number. This information will be confirmed by the NIH Computer Center staff member and recorded in the Magnetic Media Log along with the serial number and account/initials combination of the tape.

Security cannot be provided by the NIH Computer Center alone. Users must also take actions to utilize the security facilities provided and to promote security in their working locations.

Rooms housing workstations should be locked; keywords, passwords, etc. should not be kept near the workstation; papers with privacy data or any reference to passwords and keywords should be kept in a locked area; and workstations accessing sensitive data should be turned off after use. Any security system provided by the NIH Computer Center is only as effective as the efforts of the people using it. Remember; security is everyone's responsibility.

4.3 DISASTER RECOVERY PLANNING

The NIH Computer Center continually reviews and tests its disaster recovery plan. Likewise, users should periodically review their systems and data, and understand their requirements and responsibilities in the event of a disaster at the NIH Computer Center. Successful preparation for a disaster, as for more minor problems, requires a partnership between Computer Center staff and users responsible for critical applications.

The NIH Computer Center creates full volume backups, every week, of all public disks that are used for the permanent storage of data. Both FILE disks and system disks are backed up. The backup tapes are stored in the machine room one week, and sent off-site on alternate weeks for safe storage in a secure facility. In this way, some data and system recovery will be possible if there is a catastrophe, such as a serious mechanical system failure, a water leak, or a fire, in the Building 12 complex. This also means that the off-site backup data may be up to two weeks old. In the event of a disaster, these backup tapes will be used to restore data at an off-site recovery facility, and at the NIH Computer Center as soon as the complex is operational. Data sets on these off-site backup tapes are not available to users who inadvertently lost their data. No plans are currently in place to provide automatic backup of user data stored on tapes in the Center's Tape Library. Users are responsible for backing up their own data stored on tapes.

It should be noted that any part of a disaster recovery plan is overhead cost. However, the benefits of preparing for disasters, and for other contingencies as well, can be substantial. Further, many program managers have improved their production systems significantly as a result of the systems analysis that is part of contingency and disaster recovery planning.

Disaster Recovery Program

The NIH Computer Center's Disaster Recovery Program provides disaster recovery facilities and services for "critical" applications that run on the Center's OS/390 (MVS) System. These applications, originally identified by the NIH Office of Information Resources Management (OIRM), have voluntarily joined the NIH Computer Center's Disaster Recovery Program. Their owners have accepted responsibility to prepare for disasters and periodically test their disaster recovery procedures. Program mangers of other important applications can self-declare their applications as critical, and be included in the formal Disaster Recovery Program.

The disaster recovery service is designed to minimize the effect that a disaster has on the NIH Computer Center's operations and services. In the event of a disaster, CIT staff will restore the resources necessary to support critical applications—those previously identified as such by customers—that must be available without significant interruptions. If the disaster is

extended, and if resources are available, non-critical applications will be restored at the alternate site once critical application issues are resolved. As part of its service, CIT periodically conducts tests at the off-site computer facility. Hot-site tests are used to evaluate overall NIH Computer Center and customer readiness to react in an actual disaster, as well as to help keep everyone's disaster plans current.

Whether joining this program or not, users should periodically assess the importance and criticality of their systems and data, and develop a contingency plan appropriate to their application. This requires understanding the complexity of the problem, and balancing the costs of contingency planning (and possibly achieving reasonable disaster preparedness) against the severity of potential losses. Managers of computing-dependent applications should determine the importance of each component of their system and its data, and look carefully at the likely results and ramifications of various disaster scenarios. Then, application managers will be better prepared to reduce both the chances of adverse impacts occurring and the losses if they do occur.

For information concerning the disaster recovery process, contact the Disaster Recovery Coordinator; disaster recovery policy questions should be directed to the Chief, Application Services Branch. See Section 1.3.1 for the telephone listings.

To ensure a secure backup system, users with critical data should periodically copy it to tape and arrange for off-site storage under conditions that meet their requirements. For information on transferring tapes to a Federal Records Center or the National Archives, refer to the manual *Using Tapes at NIH*. There are also a number of commercial archiving services that provide pickup, storage, and return of archival and backup data tapes. An alternative backup method involves making a copy of essential OS/390 (MVS) System data on another computing platform, such as a desktop computer. Refer to Section 7.4 for file transfer information. The backup of the disk data should be refreshed often enough to ensure that the backup could be used instead of the original if necessary.

4.4 DATA AND ACCESS SECURITY

Data security, beyond the physical security of the central computer facility and the system software that protects jobs and data while they are being processed, is the responsibility of the users who create and maintain data systems.

Users who produce listings at the central facilities containing privacy data must make sure that their pick up and delivery procedures are appropriately controlled. Users are responsible for the security of any personal data that is stored near their workstations. They must also safeguard the information describing the personal data system and the ways in which it can be accessed.

Users are also responsible for deciding what other types of computerized data may need protection and for choosing and using appropriate security measures from among those offered. Please note however: The NIH Computer Center has not been certified by the Department of Defense to process any classified military data. Since the research mission of

NIH requires data and information sharing, there will always, by design, be data that is not protected against access. Data should not be accessed without the owners' knowledge unless it is clearly intended for shared access.

The NIH Computer Center offers users a complete set of "tools" to help maintain the security of data.

- Access to the system as a whole is restricted to those who have an authorized account and registered initials. The mandatory RACF password facility allows users to protect accounts and initials from unauthorized use. The RACF facility is described in Section 4.5. See Section 4.5.2 for additional information on passwords.
- To protect direct access data sets allowing selected levels of access to designated individuals use Web RACF to access the RACF facility:

  http://silk.nih.gov/racf

- Keywords provide batch job security (RUN, FETCH, SET JOB, PURGE, etc.). See Section 4.6 for additional information on keywords.
- Project and storage initials permit groups of users to share access to specific files while maintaining the confidentiality of personal passwords and keywords. (See Sections 2.1.2.2 and 2.1.2.3.)
- The Center has developed procedures and subroutines to enable users to encrypt data. Once data has been encrypted, it can be unscrambled only by someone who knows the code phrase. This is the most secure protection available and users are urged to encrypt all data which contains personal information on individuals and any other sensitive information. The encryption facilities are described in the manual *Batch Processing and Utilities at the NIH Computer Center*. Sensitive data that is no longer needed can be erased.
- The automatic tape inventory system protects tapes against unauthorized access and safeguards the data against accidental destruction. Additionally, by using the READ attribute of VOLSTAT, a tape owner can prevent modification of tape data. (Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*). For information on the tape inventory system, see the manual *Using Tapes at NIH*.
- The NIH Computer Center's utilities and procedures to access disk data sets are designed to protect data. (Because of this, using unauthorized imported software for this purpose is prohibited.)

It should be noted that anyone who violates the provisions of the Privacy Act and permits the unauthorized release of personal information is subject to prosecution and fines.

There is virtually no security at the international or wide area network level. The local area network level is the most effective place to handle network security; there are encryption packages, etc. to prevent passwords from being openly available on the network. In addition, certain practices should be followed at the workstation level. Be sure that when you leave

your workstation for any length of time that you do not leave it in a telnet session, or if you use your workstation as a FTP server, that you do not leave it in that state any longer than is necessary.

Checking for viruses is an essential a part of workstation security. Never assume that anything, including commercial software, is free of viruses. Each workstation should be set up to automatically check for the presence of viruses and every diskette should be scanned prior to use. There are both commercial and shareware products available which do an excellent job of checking for viruses. NIHnet technical LAN coordinators have been provided with information on how to obtain a reliable shareware anti-virus package.

Security is both an individual and a network responsibility. Users should determine the need for security for their data and take the appropriate steps to ensure that security.

4.4.1 Security Violation

The NIH Computer Center carefully monitors the system security information and takes immediate action when it appears that an attempt to breach security has occurred. The NIH Computer Center security investigators immediately suspend the use of account/initials related to any security violation.

The security investigators contact the account sponsor or alternate by telephone and send confirming e-mail detailing the specific circumstances of the apparent security violation. In such a situation, it is the responsibility of the account sponsor to investigate the apparent violation. When satisfied that no improper use of the account occurred, the sponsor or alternate can then reactivate the initials through the Web Sponsor facility. No further communications with the NIH Computer Center staff will be necessary unless the investigation indicates that a security breach did in fact occur.

The NIH Computer Center's security investigators are available to assist with any aspect of the investigation. They may be reached by calling TASC.

Attempts to breach security may be innocent (simple lack of knowledge or understanding), but CIT is required to pursue all apparent security violations.

At times, users may discover apparent breaches of security (such as discovering that an unknown person is making use of their registered initials), or may need assistance with a security-related problem. The security investigators handle only problems with RACF passwords, keywords, and security violations discovered by the NIH Computer Center staff. For all other security questions call the Chief, Application Services Branch or write to the Director, Division of Computer System Services.

4.4.2 Special Precautions for Scratched Data Sets

Special precautions are necessary when scratching unencrypted sensitive data sets. The operating system does not automatically erase or "over-write" scratched data sets. In

addition, the ERASE capabilities available in OS/390 (MVS) via RACF (for RACF protected data sets) and AMS (for VSAM data sets) cause severe performance problems in the NIH Computer Center's shared disk volume environment. As a result, these features cannot be used at the NIH Computer Center. Any user with unencrypted sensitive data must take the additional step of erasing the data via the ADSERASE procedure to ensure the complete destruction of data in a scratched data set. Also, any user with unencrypted data stored on tape should erase the data via the ADSERASE procedure before releasing the tape.

A disk data set can be scratched by issuing a WYLBUR SCRATCH command, a TSO DELETE command, an AMS DELETE command (for VSAM data sets), or by a batch job using the DSSCR procedure or DISP=(...,DELETE). When the data set is scratched, the space allocated for the data set is released and the data set's entry is removed from the Volume Table of Contents (VTOC). However, the actual data remains recorded on the device. The possible breach of security occurs when a subsequent data set is allocated but never opened (not written into) on the same physical area of the disk formerly occupied by the scratched data set. If this unopened data set is then read, residual data from the scratched data set, now reserved by the new data set allocation, will be read. This scenario and the resulting security concerns have been reported to IBM, and a design level change has been requested.

An analogous situation can occur with tape data. When a tape is released (using the VOLSTAT procedure), the tape is returned to the pool of unassigned tapes in the Information Media Library. When the tape is reassigned to a new user, data left on the tape at the time of release could be read.

Users who have sensitive data to protect must make certain that the data remains unavailable even after releasing the data set. This requirement is true for sequential, partitioned, direct access, and VSAM data sets, including those protected by RACF. The way to ensure this is to use the ADSERASE procedure to erase the entire data set before scratching the data set or releasing the tape containing the data set. Of course, if the data has been encoded (scrambled), this step would not be necessary. Data scrambling can be accomplished with the DSSCMI or DSSCM utilities. ADSERASE, DSSCMI, and DSSCM are documented in the manual *Batch Processing and Utilities at the NIH Computer Center*.

4.5 RACF (IBM'S RESOURCE ACCESS CONTROL FACILITY)

HHS Information Resources Management policy requires its computer facilities to provide access control software to users for protection against unauthorized access and use of data. The NIH Computer Center supports the IBM Resource Access Control Facility (RACF) for access security and to allow users to maintain additional data protection. All account/initial combinations are automatically registered to RACF for access protection. Additional RACF data set protection is available through Web RACF on the World Wide Web at:

http://silk.nih.gov/racf

RACF controls access to data sets saved on direct access volumes (disk). Users are strongly advised to employ RACF for all disk data sets.

> **Note:** RACF protection for data sets will be **required** when the South System migrates to the "standard system" (called Titan). CIT encourages users to begin using Web RACF to create generic profiles for their data sets.

See Section 4.5.6 for a list of typical RACF functions and how they can be performed through Web RACF.

Refer to *Resource Access Control Facility (RACF) General Information,* GC23-3723 for a description of the IBM product, RACF. This manual is available through the CIT publication ordering facility. The specific implementation of RACF at NIH is best described in this section of the *NIH Computer Center User's Guide*.

4.5.1 RACF Limitations

Procedure Libraries

RACF cannot be used to control access to procedures in libraries accessed via a //JCLLIB DD statement. Procedure libraries are opened and read by the operating system immediately after a job is submitted. RACF protection verification is performed **after** this time.

Tape Data Sets

RACF protection is available for tape data sets (see Section 4.5.14). Users can also take advantage of the DSSCM utilities to protect the privacy of any backup data on tape. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*. Also, the data could be copied to a special tape, removed from the NIH Computer Center, and stored by the user under secure conditions.

4.5.2 RACFIDs and Passwords

All users are automatically registered to IBM's RACF (Resource Access Control Facility) which provides access security through a password system. The set of registered initials, referred to as a RACFID, identify the user to RACF. Every person using the OS/390 (MVS) System should have their own set of individual initials. Note that user, as well as project and storage initials, are valid RACFIDs. The account that is used, along with the RACFID forms a RACF group. For example, for a user with the initials III and the account AAAA, the RACFID would be III and the RACF group would be AAAAIII.

Users must type in their password in order to log on to the system. The password facility protects accounts against unauthorized access and charges. New users are assigned passwords when the registered initials are assigned. RACF passwords must be 4-8 characters long; they must consist of alphanumeric or national ($, @, and #) characters. Passwords automatically expire after being in use for 6 months. Users will be prompted to supply new

passwords when logging on to an online system if their current passwords have been in effect for six months. Password expiration checking will not be performed in batch jobs. Users can change their passwords at any time through Web RACF. Open your Web browser to:

http://silk.nih.gov/racf

and select Change RACF Password.

When JCL is stored in online data sets, the JOB statement should specify project initials rather than user initials. Since it is not possible to log on to an interactive system with project initials, the associated passwords are not subject to expiration limits. If the JCL contains RACF passwords, the data sets should be RACF-protected with a UACC (universal access) of NONE.

See Section 4.1 for information on how to safeguard your password and tips on setting a new password.

4.5.3 Forgotten Passwords

In the unfortunate event that a RACF password is forgotten, the user will be unable to log on or use some SILK Web applications. Due to the design of RACF, it is impossible to determine the password for any given RACFID. The account sponsor can reset passwords through Web Sponsor (see Section 12.5). To learn the name and phone number of your account sponsor, use the SILK Web Locator facility (no logon is required). The SILK Web Locator provides account and directory information through the Web. Go to:

http://silk.nih.gov/locator

As a last resort, a forgotten RACF password can also be reset by the NIH Computer Center staff.

Since the RACF password is by definition confidential, any request for "lost password" assistance will require extensive validation by Computer Center security investigators. This validation process entails checking records, contacting the account sponsor, and running software that resets the password. The length of time required for the Center to reset a user's password will depend on the time required to locate the individual who must authorize the password request. This process is typically completed by the close of the next business day. Be extremely careful not to forget RACF passwords.

4.5.4 RACF Definitions

Users should be familiar with the following RACF terms in order to use the RACF facilities effectively:

RACFID the NIH registered initials

PASSWORD	a protection for the RACFID. The password is a series of four to eight characters, specified by the user. The password must consist of alphanumeric or national ($, @, and #) characters. Passwords expire automatically after being in use for 6 months; they can be changed through the Change RACF Password function of Web RACF.
ACCOUNT GROUP	an account/RACFID combination. Each RACFID must have one or more accounts (NIH accounts that are valid with the registered initials). Each account/RACFID combination, which is also an account/initials (AAAAIII) combination, is considered to be a RACF account group. Each account group has a list of RACFIDs that are members of the group. These member RACFIDs are allowed to protect data sets that belong to the group. To change the list of RACFIDs, use Web RACF (Authorization area). In general, the RACFID in the account/RACFID combination will be the only member in the account group.
USER-DEFINED GROUP	a collection of RACFIDs that can be treated as a single entity for the purpose of data set protection. Each user-defined group has three components: a two-to-eight character name (of the form @name), an owner, and member RACFIDs. RACF groups offer a convenient way to control access to one or more data sets. When you protect a data set you specify an access list of users who will be able to read or update the data set. If the access list includes RACF groups, you can maintain a single RACF group containing the RACFids of persons who are able to access your data sets.
OWNER	the RACFID with the authority to perform RACF functions that no other RACFID can perform. There is an owner for each RACFID, account group, user-defined group, and protected data set.

In general, the RACFID is specified as its own owner.

- The owner of an account group can authorize other RACFIDs to protect data sets stored under that account group. All data sets belonging to the account group have the same high level prefix, account/RACFID, which is the AAAAIII for the data set.
- The owner of a user-defined group is established when the group is established. The owner is the group member RACFID with authority to add and remove members and delete the group.
- The owner of a data set is established through the RACF Profiles area of Web RACF, and is the RACFID of a user who can authorize other users (both individuals and user-defined groups) to access the data set.

The owner is the only person allowed to change ownership. The owner of a data set can be changed in the RACF Profiles area (Change owner of RACF profile) of Web. The owner of a user-defined group can be changed in the RACF Groups area (Change owner of a group) of Web RACF.

UNIVERSAL ACCESS (UACC)

established in the RACF Profiles area of the Web RACF facility. It is used to establish initial protection for the data set. The Universal Access specifies the default access to the data set for users who have not been specifically authorized to access the data set. The choices are:

NONE	Allow no access
READ	Allow only read access
UPDATE	Allow read and write access
ALTER	Allow read, write, scratch, and rename access; also allow the user to change the protection of a data set. The UACC can be changed using the Change Owner or UACC (for profile) function.

ACCESS LIST	the list of RACFIDs and user-defined groups that have been authorized to access the data set, and the level of access (NONE, READ, UPDATE, or ALTER) for each. The access list is saved in a system database and is not part of the actual data set. The access list is created and changed through the RACF Profiles area of Web RACF. To display the access list, use the RACF Profiles (Display (RACF profile for a data set)) area of Web RACF. In addition to the authorities listed in the access list, any batch job or interactive session with a RACFID and account that is the same as the account/initials in the high level prefix of a data set will have ALTER access to the data set.
GENERIC PROFILE	a profile that uses special characters (%, *, **) to create a "mask" that is compared against the actual name of a given data set and if matched, grants RACF protection to that data set. The use of generic profiles is highly recommended. See Section 4.5.7.
DISCRETE PROFILE	RACF protection for only one data set. The name of the discrete profile matches the name of the data set protected. See Section 4.5.7.
SPECIAL CHARACTERS (Only one ** special character is allowed per profile).	the set of characters (%, *, **) that are used in the profile name to create a "mask." If no special characters are used, the generic profile only applies to one data set much like a discrete profile, though using a generic profile to protect a single data set is not recommended.

%	special character matches one character. There may be one or more in a profile. For example, AAAAIII.DATA%%%.TEST would protect the data set AAAAIII.DATAMIN.TEST.
*	special character matches zero or more characters until the end of the qualifier. It only applies to one qualifier, that is, the generic profile AAAAIII.AB.CD* would profile data sets AAAAIII.AB.CD or AAAAIII.AB.CDEF, but would not protect data set AAAAIII.AB.CD.EF. Used as a qualifier at the end of a profile to match one qualifier until the end of the data set name. For example, the generic profile AAAAIII.AB.CD.* would protect data set AAAAIII.AB.CD.EFG, but would not protect data set AAAAIII.AB.CD.EF.GH.

** special character matches zero or more qualifiers. For example, AAAAIII.AB.CD.** would protect AAAAIII.AB.CD or AAAAIII.AB.CD.EFG, but would not protect the data set AAAAIII.ABC.DEF. Note that the ** must appear immediately after a period (.), for example, AAAAIII.ABC.DE** would be an invalid profile.

4.5.5 Web RACF

Web RACF allows users to provide and maintain RACF protection for data sets and change passwords using a Web interface. Point your browser to:

http://silk.nih.gov/racf

You will be prompted for your account/initials combination and password. Select the appropriate area in order to perform the following functions:

(The actual RACF command is shown in parenthesis.)

- change RACF password

In the RACF Profiles area:

- protect a data set (ADDSD)
- delete data set protection (DELDSD)
- add user to access list to data set (PERMIT)
- remove user from access list (PERMIT)
- change Universal Access (UACC) (ALTDSD)
- change owner of RACF profile (ALTDSD)
- display data set profiles by prefix (LISTDSD)
- display RACF profile for a data set (LISTDSD)
- display if a data set is protected and if you have access

In the RACF Groups area:

- create a RACF group
- delete a RACF group
- add users to a group (CONNECT)
- remove users from a group (REMOVE)
- change owner of a group (ALTGROUP)
- display attributes, including users in a group (LISTGRP)

- display groups containing user (LISTUSER)

In the Authorization area:
- authorize others to protect your data (CONNECT)
- unauthorize others to protect your data (REMOVE)
- display users authorized to protect your data (LISTGRP)

Each time you submit a request through Web RACF, the result is displayed online. For a summary on how to perform typical tasks, see Section 4.5.6.

4.5.6 Typical Tasks

The following table describes how to perform some typical tasks with Web RACF.

Figure 4-1. RACF Typical Tasks

Task	Web RACF Area
Change the password.	Change RACF Password
Allow other users to protect data sets stored with the high level prefix of an account/RACFID of which you are the owner.	Authorization (Authorize others to protect your data)
Establish protection for a data set. (Note: protecting a data set establishes a UACC and gives the user whose RACFID is in the high level prefix of the data set ALTER authority.)	RACF Profiles (Protect a data set)*
Give other users specific access to a protected data set.	RACF Profiles (Add user to access list to data set)*
Change the access of a specific user.	RACF Profiles*
Remove the access given to a user.	RACF Profiles*
Change the UACC of a protected data set.	RACF Profiles*
Remove all RACF protection from a data set.	RACF Profiles (Delete data set protection)*
Create a user-defined RACF group.	RACF Groups (Create a RACF group)

Task	Web RACF Area
Add users to a user-defined RACF group.	RACF Groups (Add users to a group)
Remove users from a user-defined RACF group.	RACF Groups (Remove users from a group)
Delete a user-defined RACF group.	RACF Groups (Delete a RACF group)
See which RACFIDs have been authorized to protect data sets saved under a particular account/RACFID prefix.	Authorization (Display)
See the account/RACFID group names for which a RACFID has been permitted to access data sets.	RACF Groups (Display)
See which RACFIDs have been given specific access to a protected data set. (Note: The output from this function will also show the UACC of the data set.)	RACF Profiles (Display)

- GENERIC option available.

4.5.7 Protecting Data Sets

To establish protection for data sets stored on direct access volumes, go to the RACF Profiles (Protect a data set) area in Web RACF.

RACF provides the following benefits for data set protection:

- With RACF generic profiles you can easily specify that all disk data sets created under a specific account/initial combination are to be automatically protected by RACF when they are created. This capability should be used if it is essential that data be protected at the time of creation (e.g., for sensitive content).
- With RACF generic definitions you can be very selective as to which data sets are protected based on their names, and you can have different generic definitions for different sets of names.
- You no longer have to worry about the number of other people to whom your associates have divulged the keyword.
- Your associates do not have to present a keyword (interactively or in JCL) in order to have access to your data. They will be given access transparently (if they are authorized to it).

There are two methods for protecting online disk data sets with RACF; generic profiles and discrete profiles.

Generic profiles allow users to create a single profile that protects multiple data sets, and to create a profile for a data set that remains in effect even when the data set is scratched and reallocated. Using Web RACF, go to the RACF Profiles (Protect a data set) area to create a generic profile. By using the special characters %, *, ** in the profile name, you can create a data set "mask" that is compared against the actual name of the data set. If the data set name matches the mask, it receives the protection defined by the RACF profile. If none of the special characters are used in the generic profile, only the data set whose name exactly matches the profile is protected. These characters may be used alone or in combination to produce highly flexible generic profile names (See the explanation for "SPECIAL CHARACTERS" in Section 4.5.4). For example, the generic profile

AAAAIII.**

would protect all data sets stored under account/initials AAAAIII. The profile

AAAAIII.@WYL*.**

would protect all data sets stored under account/initials AAAAIII whose names begin with @WYL (this would include the WYLBUR mail data set and all ENTER MAIL file data sets whose dsnames were not specified by the user).

When using discrete profiles, the data set must exist at the time it is protected. A discrete profile is created for each data set to be protected. Alternatively, the RACF and ACCESS options of WYLBUR's SAVE command may be used to protect disk data sets when they are created. RACF data sets must have "standard" data set names. For information on data set naming conventions, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

If you are currently using discrete RACF profiles, you will probably find it more convenient to use generic profiles if possible. If a data set with a discrete profile is scratched or deleted, the RACF protection also disappears. If the data set is later recreated, no data set protection exits without establishing another discrete profile. Converting to generic profiles is simplified by the fact that if both generic and discrete profiles protect a data set, the discrete profile takes precedence. Therefore, you can create the necessary generic profiles, then DELETE the discrete profiles afterwards. As the discrete profiles are removed, the generic profiles will provide the protection.

The following tables were extracted from an IBM RACF manual and provide a summary of generic profile naming conventions.

Figure 4-2. Generic Profile Names with Special Characters at the End

Generic Data Set Profile Names Created with Enhanced Generic Naming Active—Asterisk and Double Asterisk at the End			
Profile Name	AB.CD*	AB.CD.*	AB.CD.**
Resources protected by the profile	AB.CD AB.CDEF	AB.CD.EF AB.CD.XY	AB.CD AB.CD.EF AB.CD.EF.GH
Resources not protected by the profile	AB.CD.EF AB.CD.EF.GH AB.CD.XY ABC.DEF	AB.CD AB.CDEF AB.CD.EF.GH ABC.DEF	AB.CDEF AB.CDE.FG ABC.DEF
Profile Name	AB.CD*.**	AB.CD.*.**	
Resources protected by the profile	AB.CD AB.CD.EF AB.CDEF AB.CDEF.GH AB.CD.EF.GH AB.CD.XY	AB.CD.EF AB.CD.EF.GH AB.CD.XY	
Resources not protected by the profile	ABC.DEF	ABC.DEF AB.CDEF AB.CDEF.GH AB.CD ABC.XY.XY.EF	

Source: *The Resource Access Control Facility; RACF Command Language Reference, Version 1, Release 9* (Appendix A) IBM, SC28-0733-12

Figure 4-3. Generic Profile Names with Special Characters in the Middle

Generic Data Set Profile Names Created with Enhanced Generic Naming—Asterisk and Double Asterisk, or Percent Sign in the Middle			
Profile Name	ABC.%EF	AB.*.CD	AB.**.CD
Resources protected by the profile	ABC.DEF ABC.XEF	AB.CD.CD	AB.CD AB.X.CD AB.X.Y.CD
Resources not protected by the profile	ABC.DEFGHI ABC.DEF.GHI ABC.DDEF	AB.CD AB.CD.EF AB.CDEF ABC.DEF ABC.XY.CD ABC.XY.XY.CD	AB.CD.EF AB.CDEF ABC.X.CD.EF ABC.DEF ABC.YCD

Source: *The Resource Access Control Facility; RACF Command Language Reference, Version 1, Release 9* (Appendix A) IBM, SC28-0733-12

RACF protection is available to control access to VSAM data sets. Although the data set name of the data component or component (in the case of KSDS) may be entered for RACF protection, it is suggested that the data set name of the VSAM cluster be used with the RACF facility. By protecting the cluster, the user automatically protects the data component and the component.

4.5.8 Universal Access (UACC) Levels

Establishing protection for a data set includes specifying a default level of access, known as the Universal Access (UACC) for it. The levels of access are:

- NONE — jobs are not allowed to access the data set.
- READ — jobs can only read the data set.
- UPDATE — jobs can read from or write into the data set.
- ALTER — jobs can read from, write into, and scratch or rename the data set.

RACF uses the account/initials at the beginning of the data set name. Any batch job running with a RACFID and account that is the same as the account/initials in the high level prefix of the data set name will have ALTER access to the data set.

4.5.9 Access Levels for Individual Users

To control the access level for individual users, use Web RACF (RACF Profiles area—Add user to access list to data set). The owner can give individual users levels of access different from the UACC. This involves specifying one or more RACFIDs and a corresponding level of access (NONE, READ, UPDATE, or ALTER) for each RACFID. For example, a user could specify a default, (i.e., Universal) access of READ, and then give specific users NONE, UPDATE, or ALTER access. A user who is given ALTER access will also have the

ability to change the protection of the data set. These RACFIDs and their corresponding levels of access are called the "access list" of the data set. This access list is not part of the actual data set, but is saved in a system data set maintained by the NIH Computer Center.

4.5.10 Accessing Protected Data Sets

Additional JCL is needed for batch jobs that access RACF protected data sets. This JCL supplies the RACFID and password that give the batch job access to protected data sets. To specify a RACFID for a batch job, the user must add ",USER=iii" (where iii is the RACFID) to the JOB statement following the programmer name field. Alternatively, the RACFID option of the RUN command can be used to have WYLBUR create the "USER=iii" field if the JOB statement is being created by WYLBUR. Jobs submitted without a RACFID will have only UACC to protected data sets.

If "USER" is specified on the JOB statement, the job stream must include a "/*PASSWORD pppppppp" statement (where pppppppp is the four-to-eight character password). Jobs submitted from WYLBUR or via the TSO SUBMIT command are not required to have the /*PASSWORD statement in the job stream. If "USER=iii" is on the JOB statement, and is different from the initials used to sign on, WYLBUR or TSO will prompt the user for the RACF password and insert it into the job stream immediately after the JOB statement. Note that WYLBUR and TSO do not validate the password; if an incorrect password is specified, the job will be rejected after it is submitted. If a /*PASSWORD statement is included in the job stream, the user will still be prompted for the password, but the one in the job stream will take precedence.

The account and RACFID specified on the JOB statement form a RACF group that is used to determine access to RACF protected data sets. If the high level prefix of the protected data set being accessed matches the RACF group, then the job has ALTER authority for the data set. Otherwise, the RACFID is checked against the access list to determine the validity of the access request. When the RACFID on the JOB statement is not in the access list, the job will have the access authority specified by the UACC. This check is made when the protected data set is opened. If the request is valid, processing continues normally; if not, the job will ABEND with an S913-38. If the job ABENDs with an S913-38, the JES2 JOB LOG will contain ICH408I messages that fully describe the reason access was denied. Due to the way that many NIH utilities (e.g., DSRENAME or DSSCR) allocate data sets, they will not receive the S913 ABEND. They will, however, receive all the appropriate ICH messages in the JES2 job log.

When a batch job specifying a RACFID is executed successfully, the first message in the JES2 JOB LOG will be an ICH70001I message. The date and time indicated are when the Operating System performed RACF checking for the account/initials.

SILK (Secure Internet-LinKed) Web technologies allow users to access RACF protected data sets through the World Wide Web. Users are prompted for their account/initials combinations and passwords in order to view the data set via the Web. See Section 4.5.13 for

information on creating a RACF group and generic profile for the secure SILK Web server. For more information on SILK Web technologies, see Section 8.5.

For WYLBUR and TSO terminal sessions, the user is prompted for the password and has the access authority granted to that RACFID to any protected data sets. An interactive WYLBUR user whose attempt to access a data set is denied by RACF will receive an error message and will be re-prompted for a new data set name and volume. If access to a RACF protected data set is denied to a TSO command or interactive program or to a WYLBUR batch session, it will terminate abnormally with a 913 ABEND.

4.5.11 Finding Out if a Data Set is RACF Protected

There are several ways of finding out if a data set is RACF protected. Using Web RACF, go to the RACF Profiles area (Display). The WYLBUR SHOW DSNAME command and the FULL option of the WYLBUR SHOW DSNAMES command will display "RACF PROTECTED" if the data set has been protected by a discrete RACF profile, but for all other cases, no indication of RACF protection will be displayed. The RACFCHECK function should be used in command procedures that collect the output of the SHOW DSNAMES command to determine if a data set is RACF protected. The format of the RACFCHECK function is:

```
TYPE RACFCHECK(dsname,authority,volume)
```

All three arguments are strings:

- dsname is the name of the data set, in WYLBUR format
- authority (READ, UPDATE, or ALTER). If not specified, READ is assumed
- volume should only be specified for data sets on dedicated disks.

The return codes from the RACFCHECK function are:

0 Data set is not RACF protected
1 Data set is RACF protected and user has proper authority
2 Data set is RACF protected and user does not have proper authority

Examples:

```
TYPE RACFCHECK('@WYLBUR.MAIL', 'READ')
TYPE RACFCHECK('&AAAAIII.PROJECT.DATA', 'ALTER')
```

The output of DISKMAP and ADSMAP includes a field, called "IN" (for INdicator). This two-character indicator (IN) field is data set on the volume. If the first character of the IN field is 4, 5, 6, 7, C, D, E, or F, then the data set is RACF protected. The IN (INdicator) field does not indicate whether or not a VSAM data set is RACF protected. The AMS LISTCAT command provides this information for VSAM data sets. See the preface *Using VSAM and AMS at NIH* for details.

4.5.12 Backing Up and Restoring RACF Protected Data Sets

The NIH Computer Center uses IBM's Hierarchical Storage Manager to back up users' data sets. (For details on HSM, see Section 13.1.4.1.) WYLBUR's ENTER RESTORE command is used to recover lost or damaged sets to FILE volumes.

The following rules apply mostly for discrete profiles:

- HSM backs up the RACF discrete profile for cataloged RACF-protected data sets. Therefore, if you are recovering a RACF-protected data set that was originally cataloged, you will be prompted for a RACF userid and password with sufficient authority to recover the data set. The authority needed is as follows:
  - If the data set is being recovered without giving it a new name, then ALTER authority to the data set is required.
  - If the data set is being recovered with a new name, RACF read authority to the data set being recovered is required. In addition, if the "newname" data set is being replaced, ALTER authority to that data set is required.

- The RACF discrete profile for the recovered, cataloged data set will be created as follows:
  - If a profile still exists for the original data set (i.e., the original data set has not been scratched or had RACF protection removed), it will be used for the recovered data set.
  - If the original data set and profile no longer exist, the profile that was in effect at the time of the most recent backup of the cataloged data set will be used.

Jobs that back up protected data sets to tape or the MSS must have at least READ access to those data sets. This is true for both discrete and generic profiles.

When a data set with a discrete profile is scratched, its RACF protection is also removed from the system. Therefore, if a protected data set that has been scratched is being restored, the data set will have to be re-created from its backup, and then protected again. Go to the RACF Profiles area of Web RACF (Protect a data set). On the other hand, if a protected data set is being restored by overwriting it with a backup version, the executing job must have UPDATE access to the protected data set being restored.

If a generic profile protected a data set when it was backed up, there must be a generic profile protecting it when the data set is restored.

The user must ensure that maintenance jobs run against any dedicated disk that contains RACF-protected data sets (e.g., DISKMAP, DISKSAVE) are submitted with a RACFID that has authority to access all protected data sets. (Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for details on use with dedicated disks.)

4.5.13 Creating a RACF Group and Generic Profile for SILK Web Servers

To protect OS/390 (MVS) data sets accessed through a secure SILK Web server, use the RACF facility with RACF groups and RACF generic profiles. This procedure is summarized below.

Figure 4-4. Linking RACF Groups with Generic Profiles

Task	Web RACF

Create a RACF group, which contains the list of users who will be allowed access to a data set.	RACF Groups area
	• Create a RACF Group
	  • enter a group name
	  • hit the Create button
	When the group is created you can add additional users to the group immediately
	
	or
	
	RACF Groups area
	• Add users to a group
	  • type in the group name
	  • enter the RACFids to be added
	  • hit the Add Users button

Create a generic RACF profile, which specifies the data sets to have restricted access. Specify a UACC of "NONE" initially.	RACF Profiles area
	• Protect a data set
	  • type in a data set name, following the rules for generic profiles
	  • select the access level for this profile from the drop down menu

Create a link between the RACF group and the generic RACF profile. Indicate that the data sets protected by the generic profile are to be accessible to users in the RACF group. Change the UACC to the access level you want for the group (e.g., "READ")	RACF Profiles area
	• Add user to access list
	  • select the profile from the drop down menu
	  • enter the name of the RACF group to the access list
	  • choose an access level from the drop down menu
	  • hit the Add Users button

4.5.14 Extended Security for Tape Data

Tape owners on the OS/390 (MVS) South System can request extended security controls using RACF facilities to protect especially sensitive data. This extended protection is controlled by the volume owner identified by an account/initials combination (e.g., aaaaiii) and may be used to restrict who may read or update data on a tape.

Because of the manual effort required to setup the RACF environment necessary to provide this security, extended tape security is not widely available at this time. An account sponsor must request or terminate the extended security controls in writing. The request must contain:

- the account/initials combination that will be used as the owner of tapes that are to be secured
- the name of the RACF group that will contain users permitted READ access
- the name of the RACF group that will contain users permitted UPDATE access
- the account sponsor's signature

This request should be sent to:

National Institutes of Health
Center for Information Technology
Security Investigators
Building 12A, Room 4011
12 South Dr. MSC 5607
Bethesda, MD 20892-5607

or faxed. Refer to Section 1.3.1 for the fax number for security investigations.

A sample request is located on the Web at:

http://silk.nih.gov/silk/tapes/request.html

Tape Data Ownership

When a user allocates a new tape volume and writes data on it, that user becomes the "owner" of the tape (unless ownership is transferred using /*ASSIGN or VOLSTAT control statements). Usually the account/initials of that user will be used as the high level qualifier of the data set that is written to the tape. The extended security controls READ and UPDATE access for tape volumes belonging to the owner, aaaaiii, and works as follows:

- READ—users in the group permitted READ access may read any data on a tape owned by aaaaiii.
- UPDATE—users in the group permitted UPDATE access may create new tape data sets, update or re-write data, and read data on any tape owned by aaaaiii. Users with UPDATE authority can also create new data sets with the high-level qualifier aaaaiii on any tape volume, regardless of ownership.

- Users in neither RACF group may not access any tape owned by aaaaiii, nor may they create a tape data set with the high-level qualifier aaaaiii, regardless of who owns the tape.

Defining Access Control
The RACF groups used to define the tape READ and WRITE limitations may be existing groups or may be created using Web RACF (see Section see Section 4.5.5). Subsequent users can be granted access to the tape data by the group owner using Web RACF.

4.6 KEYWORD PROTECTION

> The keyword facility will be eliminated in the near future. All disk data set protection should be controlled by RACF. See Section 4.5.

The keyword provides security for batch job submission. Users are required to have a three-character keyword for each account and initials pair used. New users will be automatically assigned the first three characters of their RACF passwords as their keywords. The keyword can be changed at any time by the user through WYLBUR's SET KEYWORD command. See Section 4.1 for information on how to safeguard your password and keyword.

Keyword information must be included in every job that is run with another user's account and initials. WYLBUR and TSO prompt for keyword information from the user when a batch job is submitted and supply it directly to the system. Jobs submitted directly to the system must include a /*KEYWORD control statement in the job control language. (Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.)

If your keyword must be used by other people for the purpose of manipulation of communal data, investigate the use of project or storage initials described in Section 2.1.2. Users who require additional protection for data sets should use the RACF facility (see Section 4.5).

4.6.1 Allowable Keywords

A keyword is made up of three alphabetic, numeric, or national ($, @, and #) characters other than the user's initials. Blanks are not permitted. If a keyword contains a character, which cannot be entered from a certain terminal, that terminal cannot be used until the keyword is changed.

4.6.2 Forgotten Keywords

Users who are already logged on to the system can reset their keywords for the associated account/initials combination in use. Simply type WYLBUR's SET KEYWORD command; it is not necessary to remember the old keyword for this procedure.

The user or the account sponsor can submit requests for forgotten keywords. Requests may be submitted through a Service Request Ticket (see Section 5.2.2), by fax transmission (see Section 1.3.1), or in a memo addressed to:

National Institutes of Health
Center for Information Technology
Security Investigators
Building 12A, Room 4011
12 South Dr. MSC 5607
Bethesda, MD 20892-5607

The request must include the account and initials associated with the requested keyword. If this information is incorrect or incomplete, the request will be rejected and returned. Making certain that the required information is accurate and complete will avoid the time delay involved in a returned Service Request Ticket or memo and the need to submit another request.

When the correct information has been confirmed, the security investigators will give the keyword to the account sponsor or documented alternate on the following business day. To learn the name and phone number of your account sponsor, use the SILK Locator facility. See Section 1.3.2.

5 USER SERVICES

This section discusses the many types of personal assistance available to users to help them make efficient and effective use of the OS/390 (MVS) South System of the NIH Computer Center. The CIT Technical Assistance and Support Center (TASC) supplies many of these services with support from the staff of the NIH Computer Center. This section also describes adjunct services to handle and distribute output. Other services provided to customers of the NIH Computer Center are described in Section 1.1 under the individual descriptions of the organizational components of CIT.

The comprehensive consulting services offered to customers by CIT include problem resolution, as well as debugging assistance and diagnostic interpretation. Consulting is available on connectivity strategies and services, including interactive login and file transfer services that are part of NIHnet. Consultants are also available when a system problem occurs that prevents a user's work from continuing—a situation which requires a quick response for a solution/circumvention. Submit a Service Request Ticket to report problems, make suggestions, apply for refunds, and request consulting assistance. Service Request Tickets can be submitted through the World Wide Web at:

http://datacenter.cit.nih.gov/srt

or by e-mail. See Section 5.2.2 for further information.

The CIT Computer Training Program offers classroom and self-study courses specifically designed to teach students how to use the services of CIT and the NIH Computer Center.

All publications describing the Center's services are kept in stock by the Technical Information Office for quick response to online orders and walk-in and telephone requests. Individual documentation profiles allow customers to receive updates automatically when publications they need are revised. See Section 6 for information on ordering publications.

The NIH Computer Center uses electronic mail to notify individual users of changes, which may affect their use of the Center (e.g., when their inactive tapes or MSS data sets are to be released). See Section 5.4.1 for a description of other services that generate electronic mail messages.

The NIH Computer Center maintains and runs a comprehensive Test Job Stream composed of selected samples of users' applications. The Test Job Stream provides special assurance to users with vital production systems that future changes to the NIH Computer Center will not have a negative impact on their work.

Terminal support services include providing advice and assistance in accessing the mainframes using a variety of communications devices.

5.1 SOFTWARE SUPPORT

The CIT's Technical Assistance and Support Center (TASC) offers consulting and assistance on a variety of software and services. Although TASC will try to answer questions on any product used by CIT customers, there are two levels of support guaranteed for services and software that CIT provides on the OS/390 (MVS) South System.

Each software product offered is classified according to the support that it receives from CIT. Level 1, the default, offers full support whereas Level 2 offers limited support. Software designated to receive lower levels of support will be explicitly identified in *Interface* articles and prefaces attached to the technical documentation for that product. Additional unsupported software may be listed in the *NIH Computer Center User's Guide.*

Level 1 Software Support

Level 1 software receives full consulting, service request tickets (SRTs), technical documentation, maintenance, advance announcement of all changes in *Interface*, and full conversion support (if the product is upgraded or discontinued). Generally, for Level 1 products, the vendor appears to be stable and responsive to support issues and CIT can verify that the products are compatible with other Level 1 products.

Level 2 Software Support

Level 2 software receives a reduced level of assistance with problem diagnosis and more limited maintenance service than software with Level 1 support. Although documentation is provided through the Division of Customer Support, maintenance and training is provided only by the vendor or as resources permit.

For Level 2 products TASC cannot provide the same degree of expertise, turnaround time or technical review as can be expected for Level 1 software.

Products typically receive Level 2 support if they meet one or more of the following criteria:

- The product is in test status.
- The product does not run on the central servers.
- The vendor does not seem to provide a high level of support for the product—CIT has determined that time frames for problem resolution are long, or that product availability with vendor support cannot be ensured.
- CIT cannot provide necessary upgrades and/or maintenance.

Although Level 2 software support provides documentation, limited problem tracking service, and limited *Interface* pre-announcement of changes, continued availability or conversion assistance may not be available if the software is discontinued.

Despite these limitations, many users have found that software receiving Level 2 support, can be very useful. Since CIT cannot guarantee the proper functioning and long-term availability

of such software, users should thoroughly consider the effects of Level 2 support before incorporating such software into production applications. Application developers should be aware of the implications of using Level 2 software in long term, time-critical applications. Having a fallback plan enables the application user to meet deadlines even in the unlikely case that the Level 2 product becomes unavailable or inoperable.

If you have any questions regarding levels of support, please call TASC.

Current Software
Level 1 and Level 2 software products are listed below. In addition to there are utilities that are documented in the manual *Batch Processing and Utilities at the NIH Computer Center*.

Figure 5-1. Level 1 Products

Level 1 Products	
Category	**Software Product**
Operating System	OS/390 Operating System and Job Control Language
SILK Web Facilities	Customized Servers
	Easymail
	Formsmail
	Service Request Ticket (SRT)
	SILK Locator
	Web Listoff
	Web RACF
	Web Sponsor
	Web Submit
Data Base Technologies	DB2
	IMS
	Neon Shadow Direct (ODBC)
	Oracle SQL *Net
	Oracle SQL *Plus
	QMF
Interactive Systems	ISPF
	TSO
	WYLBUR
Programming Languages	COBOL/370
	High Level Assembler
	PL/I Optimizer
	REXX/370
	VS FORTRAN
Other	CONNECT:Direct
	Kermit (TSO-Kermit)
	NBARS (ADSM Software)
	VTAM Printer Support System (VPS)

Figure 5-2. Level 2 Products

Level 2 Products
BMC LOADPLUS (DB2 Facility)
DB2 Connect
EZFORM/PTFORM
IND$FILE
MAX
MS-Kermit (dialup)
NetTerm
Oracle Transparent Gateway to DB2
P360
PostScript printing
Protocol Conversion Facility
QWS3270 PLUS
TN3270 for the Macintosh
WS_FTP Pro

Unsupported Software
Software products that no longer receive any Computer Center support may still be available for users. There will not be any assistance for these applications if users encounter problems with them, nor will we fix, upgrade, or test these products.

Some products have their software and documentation "frozen," but are left for user access so long as they continue to function. The Technical Information Office will not provide vendor documentation for these products.

- NIH Computer Center (RHB) Routines—This is a group of Assembler Language routines available at the NIH Computer Center to provide additional functions for high-level languages. Such diverse functions as terminal I/O, bit manipulation and data set scrambling and unscrambling are handled by these routines. **Note:** Some of these routines were not Y2K-compliant and have been removed from the system.
- VISION:Builder and VISION:Report—See Section 8.7 for information.

5.2 CONSULTING

Consulting services are offered to all registered users, without charge, through the CIT Technical Assistance and Support Center (TASC).

5.2.1 Telephone and Walk-in Assistance

The CIT Technical Assistance and Support Center (TASC) provides telephone and walk-in consulting on the services and facilities supported for the Enterprise Systems. Call (301) 594-6248. TASC is located in Building 12A, Room 1011 on the NIH campus. Refer to Section 1.4 for the hours of operation. TASC can also be reached at the e-mail address tasc@nih.gov. Consulting assistance is available on all software supported by the Computer Center. Section 5.1 provides details on the levels of software support.

The TASC consultants can answer most questions, but will refer more complex problems to subject matter specialists. The expertise and experience of the senior staff members are available to any Computer Center user who calls the CIT Technical Assistance and Support Center (TASC).

Regardless of the software you are using, if you think that an action you are taking at a terminal or a batch job you are running is causing the system to crash, you must contact TASC immediately. If you cannot reach TASC, submit a "Critical" Service Request Ticket and suspend all action until you are notified. Do not try to modify the command or job and resubmit it. (See Section 5.2.2 for information on submitting Service Request Tickets.)

Users who plan to acquire or develop large systems at the NIH Computer Center should contact CIT to set up a meeting to discuss the proposed software in detail. This will help ensure that the new system will adhere to the job standards and will not conflict with published restrictions.

Questions concerning LANs, networking and NIHnet (e.g., electronic mail addressing, communications with the Enterprise Systems using the TCP/IP protocol, and network connectivity strategies) can be handled through TASC.

As an additional way to ensure full support for network users, each LAN connected to NIHnet has a technical LAN coordinator. Users on a LAN connected to NIHnet who have connectivity problems should first contact their TLC for assistance. The TLC will work with CIT in the event of a networking or connectivity problem between a LAN and its NIHnet connection. For full information on technical LAN coordinators, see Section 5.2.3.

5.2.2 Service Request Ticket

Users can report problems and request refunds, as well as communicate suggestions, comments, and needs to CIT through a Service Request Ticket. The information from these reports help the staff formulate future policies, plan systems changes, and inform users of common trouble areas. Service Request Tickets can deal with supported software, hardware, network connections, or service, as well as the Enterprise Systems (including OS/390). The staff will not be able to respond to problems with software or hardware (e.g., workstations) not supported directly by CIT.

5.2.2.1 Submitting a Service Request Ticket

Every Service Request Ticket should include a complete description of the problem. Section 5.2.2.2 describes the documentation that should accompany a Service Request Ticket. If users wish to cancel a Service Request Ticket (e.g., the problem has been solved or they no longer require an answer), they should notify TASC immediately via phone or by submitting another report requesting the previous report be cancelled.

There are several methods of submitting a Service Request Ticket.

- **World Wide Web**

  Users with NIHnet or Internet connections can submit a problem through the World Wide Web. Connect to:

  http://datacenter.cit.nih.gov/srt

- **Electronic Mail**

  Service Request Tickets can also be submitted by sending electronic mail to tasc@nih.gov.

5.2.2.2 Providing Documentation for a Service Request Ticket

For any Service Request Ticket, whether submitted via e-mail or the World Wide Web, the description of the suggestion, problem, or complaint should clearly, but briefly, explain the area of concern. The problem description should include the following:

- names of all related data sets
- tape volumes for data sets stored on tape
- whether a batch job that has encountered a problem can be rerun
- job numbers of any jobs that relate to the problem
- other information that might help to resolve the problem

All necessary documentation and data for the problem investigation (e.g., source, data sets, disks, and tapes) must be frozen until the problem has been studied; this is critical in cases

where the problem must be reproduced in order to obtain a resolution. Send the hardcopy documentation to TASC. A common cause of delay in processing and answering Service Request Tickets is that users fail to provide all the necessary documentation.

Submitters should be certain to include their own names and correct telephone numbers on Service Request Tickets since TASC frequently must contact the individual before being able to resolve a problem.

The amount of documentation needed depends on the severity, complexity, and nature of the problem. For example, if a job fails and a rerun with no changes is successful, the failing and successful jobs are all that is needed for documentation. TASC will not attempt to help users with any jobs that suppress messages (e.g., MSGLEVEL=(0,1)). A complete dump may be needed to document any job, which terminates with a system ABEND (ABnormal ENDing). For information on obtaining dumps, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

For printing problems, extensive listings may not be required. Often the output header and trailer sheets, the job accounting block (located just before the program output), and a few pages showing the problem are sufficient to determine the problem.

Any problem involving an unassigned off-line output tape (e.g., MICRO) must be reported immediately since scratch tapes mounted for off-line output are kept no more than 24 hours.

When reporting a problem with an interactive system (e.g., TSO, DB2, or WYLBUR), the user must include in the problem description specific instructions describing how the problem can be re-created. A TSO CLIST, a WYLBUR script file, or hardcopy documentation from a printer attachment may be used to supplement this information.

5.2.2.3 Requesting a Refund

To obtain a refund, a user must submit a Service Request Ticket, either by e-mail or through the Web. All supporting documentation should be sent to the NIH Computer Center, including source listings, dumps, entire session listings (see Section 5.2.2.2). Requests for refunds must be received within three working days after the interactive session or batch job run has been completed. Any request for a refund of printing charges must include the printing charge page that immediately precedes the job's trailer sheet.

See Section 3.10 for a summary of the conditions under which a refund will be granted. A refund request, which does not fulfill the criteria listed, must be denied.

5.2.2.4 How a Service Request Ticket is Processed

When a Service Request Ticket is received, it is examined to ensure that all necessary documentation is available. The Service Request Ticket is then sent to a staff member or forwarded to the group responsible for the area in which the problem occurred. The NIH Computer Center staff and IBM representatives receive most of the Service Request Tickets

that cannot be handled by the TASC staff. If the final answer to a Service Request Ticket will be delayed because only a long-range solution is possible or because it must be forwarded to another group for handling, the consultants will attempt to inform the submitter and find a circumvention.

Service Request Tickets are tracked internally by Remedy's Action Request System (AR). This system creates a "ticket" that is associated with a user's problem.

When staff members have completed work on a Service Request Ticket, they will respond to the submitter by telephone or electronic mail. In the case of a problem, the response will consist of the solution to the problem. Similarly, responses to Service Request Tickets that contain requests, suggestions, or questions are also transmitted by telephone or electronic mail to the submitter. This use of electronic mail for response delivery provides a speedy mechanism to send information to users.

5.2.2.5 Service Request Ticket Priority and "Critical" Tickets

Under certain circumstances a Service Request Ticket can be designated as "critical"—i.e., the problem being reported requires immediate attention or is critical to day-to-day production system computing tasks. When submitting this type of Service Request Ticket via the Web, select the "critical" button.

Critical Service Request Tickets are examined frequently throughout the workday, and every effort will be made to provide a "fix" or circumvention within a week of receipt of all necessary information. Whenever possible, a temporary solution or bypass for the problem will be provided. Non-critical Service Request Tickets are examined each workday and addressed as quickly as feasible. However, because of workloads and resource limitations, up to four weeks may be required before a final resolution is provided.

Before submitting a critical Service Request Ticket, it is often useful to discuss the problem with the TASC consultants. A problem can be considered critical if it is severely impacting production (not test or development) work and cannot wait. Service Request Tickets should also be designated critical if you suspect that your batch job or session has adversely affected the NIH Computer Center. The 1-week response to critical problems can be offered only if it is not abused. Permanent fixes typically take longer since they must be supplied by the software developer or vendor.

Because fixes for Level 2 software often must come from the software or hardware vendor, the commitment to problem resolution within a week cannot be made; as a result, the critical designation for Service Request Tickets is not accepted for Level 2 software. For further information on Computer Center policies in regard to Level 2 products, see Section 5.1.

5.2.3 Network Assistance - Technical LAN Coordinators

Network assistance is available through the technical LAN coordinators (TLCs), who are the LANs' representatives for coordinating the connection of all LANs to NIHnet and providing input for future NIHnet enhancements. TLCs serve as the primary contact between the users of the LAN and CIT. The TLC will be contacted in the event of any problems or questions related to the LAN's connection to the wide area network. NIHnet provides connectivity services to LANs over a wide area, both on and off campus. Support for the NIHnet wide area network requires a collaborative effort between CIT and TLCs.

If problems arise when using NIHnet connectivity services on a LAN, the TLC is the first person who should be contacted for help. The TLC is very familiar with the LAN and is kept informed of the overall network status, including planned outages.

Other essential tasks of TLCs include assigning Internet Protocol (IP) addresses on TCP/IP LANs and keeping NIHnet records accurate.

Users can find out the name of their TLC by contacting the Technical Assistance and Support Center (TASC) or by pointing their World Wide Web browser to:

http://www.net.nih.gov

and selecting "Networking Tools."

5.2.4 Database Assistance

There are several forms of assistance available on database technologies.

Telephone Assistance
Contact the Database Technologies Section for telephone assistance. Refer to Section 1.3.1 for the Computer Services Directory.

Documentation
There are many database-related publications that can be ordered through the CIT publication ordering facility. This system contains a current list of the DB2 manuals.

For more information on relational database facilities supported at the NIH Computer Center, use the World Wide Web to connect to:

http://silk.nih.gov/dbtech

Automatic Change Notification
CIT will notify users on upcoming DB2-related system changes, outages, and other pertinent information. This is especially useful for database administrators and developers, and DB2 users. To receive automatic notification of changes, subscribe to the DB2-CIT listserv list. Go to:

http://list.nih.gov

to learn how to subscribe.

5.2.5 Assistance for Implementing Non-NIH Software

Users who are considering, or are in the process of acquiring or developing, a software package should contact the NIH Computer Center to arrange a meeting to discuss implementation. The purpose of this meeting is twofold:

- To ensure that the proposed software will comply with the NIH Computer Center standards and will not have a detrimental effect on other users. This compliance is mandatory in the open-shop environment at NIH.
- To help the NIH Computer Center staff project the resource requirements of the user community as a whole (e.g., additional resources such as online disks, etc.).

If a large system is designed without prior consultation with the appropriate Computer Center personnel, it may require extensive modification before it is implemented, or it may not be able to run at all. Avoiding the necessity of "after the fact" changes can result in the savings of substantial cost, man-hours, etc. In addition, the prior consultation will often result in a more efficient, bug-free and more easily maintained system.

If possible, representatives of the vendor should be present together with the user, so that they can gain an insight into the NIH environment and, along with it, a more accurate estimate of the work it will take to make the system compatible with NIH's standards. The staff will help the vendor plan the changes and installation of the system. Such a meeting, held early in negotiations with the vendor, is an important step in insuring a smooth, economical and hopefully rapid installation of the vendor's system.

The use of device-dependent data or programs should be avoided whenever possible; software packages using these features could become unusable later if the NIH Computer Center upgrades its hardware.

Some software vendors charge for the use of their software based on the number of processor complexes on which the package may run. They may require the purchaser to supply processor complex serial numbers that are then checked by the software. The NIH Computer Center's configuration is relatively dynamic. Acquisition of a new processor complex, and particularly changes or additions to processor complex serial numbers cannot be announced

in advance. Any contract to acquire software should include some allowance for the possibility of additional or replacement processor complexes.

Transferring disk data to the NIH Computer Center from other computer centers (which is done via tape), should be done using individual data sets. Attempting to restore data from a backup tape will often be unsuccessful because of hardware and software incompatibilities. See Section 7.4.7 for details.

For a list of the operating system software that cannot be used at this installation, see Section 8.1.1.2. Restrictions imposed on the use of IBM utilities are described in the manual *Batch Processing and Utilities at the NIH Computer Center*.

5.2.6 Telecommunications Assistance

TASC (the CIT Technical Assistance and Support Center) provides advice and assistance to users with a wide variety of telecommunications and connectivity problems. Users who suspect that communications hardware maintained by CIT may be causing their problems can contact TASC. CIT can provide help with:

- mainframe connections via telnet
- Parachute
- dedicated phone lines
- mainframe dialup ports
- modems
- DSUs/CSUs (data service units/channel service units)
- 3270 communications
- SNA cluster controllers
- RJE communications
- LAN connections (communications problems)
- JES2/NJE node connections

TASC can help users resolve hardware incompatibility problems with supported connectivity software. TASC also handles many of the telecommunications issues when connecting LANs to NIHnet. They analyze the source of communications link problems with networks. They also carry out SNA/SDLC and 3270 registrations and help users set up communications links for 3270-compatible terminals.

5.2.7 Special Services Team Assistance

As part of CIT's broad information technology support to the NIH community, CIT's Special Services Team (SST) supports Windows, Macintosh, and Unix desktops and servers at many sites across NIH. SST provides support services on an as-needed, short-term or long-term schedule according to the customer's needs on a fee-for-service basis.

The team includes specialists in Windows 95 and 98, Windows NT workstations and servers, Apple Macintosh workstations, including the iMac and Macintosh-based servers, as well as Sun, SGI and Linux-based computers. Many team members support multiple IT platforms to better meet customer needs.

For fee schedules and further information, please contact TASC.

5.2.8 CIT Knowledge Base

The CIT Knowledge Base (KB), the database of technical support information and references to outside resources created, maintained, and used by TASC consultants, is available through Web. It includes information on software products, instructions for changing passwords, e-mail client configuration, Listserv lists, and many other topics. You can access the KB from the CIT home page by selecting Help Desk Knowledgebase at the bottom of the page, or go to:

http://kb.nih.gov

CIT can also provide NIH organizations with their own closed knowledge domain. For further information, contact TASC.

5.3 TRAINING

The CIT Computer Training Program offers a variety of classroom courses to assist users in making effective use of computers at NIH. Many seminars address the uses of computers in science. A variety of self-study courses are also available. Descriptions of all classroom courses, seminars, and self-study courses provided by the CIT Computer Training Program are available through the World Wide Web. Course information is kept up-to-date; when a course fills early and a new session is scheduled, it will be shown. You can register for a class through an online application form. For training information and registration go to:

http://training.cit.nih.gov

As a convenience to NIH personnel, the CIT Computer Training Program Web site has links to other computer training programs available at NIH.

The training staff can answer any questions about these courses and give assistance in selecting the best course to fill specific needs. Contact TASC if you have any questions. There is no charge for courses in the CIT program, and application is made through the World Wide Web or on a simple one-page online form (which can also be mailed or faxed).

The CIT Computer Training Program fully accommodates students with disabilities. Classes are located in a wheelchair-accessible building. People with disabilities are welcome to attend any course or seminar offered by the CIT Computer Training Program for which they have the appropriate professional background. Prospective students should inform the training staff if special assistance will be needed. For more information, see Section 1.7.

5.3.1 Classroom Training

There are three terms each year: fall, spring, and summer. Subjects include: personal computers, networks, Internet resources including World Wide Web facilities, OS/390 (MVS) systems, computer security, database topics, Unix, SAS, NIH Data Warehouse information, and scientific seminars.

Whenever possible, special seminars will be scheduled to meet the needs of organizational groups. For information on scheduling a special seminar for your group, contact the staff of the CIT Computer Training Program through TASC.

5.3.2 Independent Training

A variety of self-instruction methods are offered for students who want to study independently. Full details and a complete list of independent training courses can be found at the CIT Computer Training Program Web site.

5.4 COMMUNICATIONS BETWEEN USERS AND THE COMPUTER CENTER

The training and consulting services described earlier in this section comprise two-way communication between users and the NIH Computer Center. Input from users is a critical element in determining Computer Center goals, policy, and allocation of staff time. It greatly affects the quality and timeliness of the end products provided to the user community. The CIT Technical Assistance and Support Center (TASC) provides information on setting up accounts, training, software, e-mail and a full range of technical issues. Suggestions on how to improve our service are always welcome. The technical LAN coordinators (TLCs) assist users with network connections between the LANs and NIHnet. The Service Request Ticket, described in Section 5.2.2, is an important communication tool for users who need help. Publications, such as *Interface*, are effective vehicles for Computer Center-user communication. The communication tools described in this section complement the general links described above.

5.4.1 Electronic Mail

Electronic mail is the standard means of communicating with users of the NIH Computer Center, whenever feasible. Many services provided by the Center automatically generate messages that are critical to the effective use of the system and transmit them to users via electronic mail. Users receive electronic mail from the NIH Computer Center regarding the following services:

- When account sponsors use Web Sponsor to make account changes, they receive verification by electronic mail to the designated preferred initials.
- Deregistration officials receive official notifications by electronic mail sent to the designated preferred initials.
- CIT security investigators send e-mail to account sponsors detailing the specific circumstances of apparent security violations.

Because of the importance of these mail items, it is imperative that all users of the NIH Computer Center review their electronic mail on a regular basis. In many cases, this is the sole means of communication with users, therefore, make a regular reading of mail a vital part of your investment in mainframe computer and NIHnet use.

Electronic mail for a set of WYLBUR initials can be forwarded to another electronic mail address by going to:

http://silk.nih.gov/wylbur/reroute

or by using the SET FORWARDING command of ENTER MAIL. This facility can be used to forward mail for storage initials to the owner or to forward mail for a LAN user to the correct LAN e-mail address. All electronic mail notices from the NIH Computer Center, such as mail about data sets to be scratched or tapes to be released, can be forwarded to the specified mail address. See Section 12.1.1 for more information on WYLBUR's ENTER MAIL facility.

Anyone who needs assistance in using ENTER MAIL, or who receives mail from the NIH Computer Center that is confusing or unclear, should simply call TASC. Communication is an integral part of our services. We welcome comments and ideas on possible ways that it could be improved.

5.4.2 Other Methods of Communication

Other methods of communicating with CIT include:

WYLBUR Comment Facilities
Many command procedure interfaces, such as ENTER MAIL, have internal comment facilities. Many improvements in these facilities have been made as a result of users' suggestions. Submit a Service Request Ticket to report problems with the system. See Section 5.2.2.

Document Comment Sheet
CIT manuals often have a "Document Comment Sheet" as the last printed page of text. Suggestions on how publications can be improved are always appreciated. Corrections will be entered the next time the document is revised.

Message of the Day
When a user logs on to an interactive system (e.g., WYLBUR or TSO) informational messages are sometimes displayed to announce schedule changes, training opportunities, recent publications, or new services. CIT posts a "Message of the Day" to convey information that will affect users.

Listserv
The listserv facility allows users with common interests to be grouped together in electronic lists that are stored by the listserv server at a particular node. CIT often sets up a listserv list to communicate changes in a particular service (e.g., a supported programming language) or to exchange information with users on a new service that is undergoing evaluation. For more information concerning listserv, go to:

http://list.nih.gov

World Wide Web
There is information on the World Wide Web concerning the services of the Enterprise Systems, including registration instructions, how to get help, and online documentation. These pages include links to other services of CIT and the NIH homepage. Visit:

http://datacenter.cit.nih.gov

Comments concerning the online material may be submitted directly from the World Wide Web.

The SILK (Secure Internet LinKed) Web public server facility, allows users to view WYLBUR's "&PUBLIC" data sets from the Web. For example, the operating schedule for the NIH Computer Center is in the data set &PUBLIC.SCHEDULE. To view this through a Web browser, go to:

http://silk.nih.gov/public/public.schedule

Note: the name of the &PUBLIC data set appears after the last slash—without the ampersand (&). For information on SILK Web technologies, go to Section 8.5.

For additional information concerning CIT accounts, training, publications, help desk, and other services, go to:

http://cit.nih.gov

5.4.3 CIT-Sponsored Users Groups

There are several other CIT-sponsored groups to help users exchange information in specific areas of interest. Contact TASC for further information. These groups include the following:

- Biomedical Research Mac Users Group (BRMUG) - Macintosh user support
- Molecular Modeling Interest Group - seminars on various molecular modeling topics to foster communication between NIH scientists concerning the methods and applications of molecular modeling
- World Wide Web Interest Group (WIG) - effective use of the Internet and the World Wide Web in support of NIH functions

5.5 USER JOB/PROGRAM TESTING

The Test Job Stream (TJS) is a collection of jobs used to test and evaluate proposed hardware and software changes for the NIH Computer Center's OS/390 (MVS) South System. The TJS is run when new versions of the operating system are installed, major modifications are made to the operating system, or new hardware is installed. TJS has enabled the NIH Computer Center staff to minimize the impact of system changes on customers by identifying and eliminating problems before implementation.

Some of the specific functions of the TJS include:

- identifies problems that may exist in new or revised software or hardware which would prevent customer jobs from running
- discloses charging inconsistencies including variations in CPU time, I/O counts, and core usage
- provides tuning information by indicating areas of the system that are inefficient

- supplies throughput statistics which are used to analyze workloads and their projected effects on system performance

The NIH Computer Center staff is always looking for new jobs to include in the TJS so that testing is a representative sample of what customers are running. Jobs that are critical to the organization or that use unique features are highly desirable. Customers should call TASC to have their jobs included in the TJS.

5.6 DISTRIBUTION OF USER INPUT/OUTPUT

Output Distribution Services serves as an intermediary between users and Operations staff for the Enterprise Systems and the Helix Systems. They accept and route to the appropriate system special forms, media, and other resources requested by users to process their jobs. Upon completion of a job, the hardcopy output is separated, sorted, and then filed in the user's registered output box or mailing box. For instructions on how to register for an output box or mailing box, see Section 2.1.3.

Other services performed by this group include:

- accepting "special" magnetic media (tapes or cartridge tapes that are not stored in the Information Media Library) and handling initialization requests for "special" media
- registering and accepting user-supplied forms (labels, paper)
- creating and registering Forms Control Buffers (FCBs)
- registering and accepting user-supplied forms slides
- registering and issuing Box Access Codes to users for electronically controlled, locked computer output boxes
- assisting users returning or removing magnetic media from the Information Media Library
- handling user requests to stop the processing of erroneous output (Micro tapes)

5.6.1 NIH/Parklawn Courier Service

OS/390 (MVS) users can transport tapes, computer listings, and special forms between the output distribution counters at the NIH Computer Center and the Parklawn Building. A courier service operates twice daily on the following schedule.

	Location	**Departure Times** (approximate)
NIH Campus	Building 12A Room 1000	8:30 a.m. and 12:30 p.m.
Parklawn Building	Room 2B70	9:00 a.m. and 1:00 p.m.

Make sure the items to be delivered through this service are packaged securely and that the recipient is clearly identified before dropping them off at these locations. If you need additional information, contact TASC.

5.6.2 Misdirected Output

Occasionally output is misdirected because of a user error or mishandling by the NIH Computer Center. This can cause great frustration for the user who should have received it. If you locate misdirected output, please inform Output Distribution Services as soon as possible.

6 DOCUMENTATION

The CIT Technical Information Office distributes general information, technical, and vendor publications as well as certain software to the user community. Many publications are also available through the World Wide Web at:

http://datacenter.cit.nih.gov/pubs.html

CIT offers a sophisticated documentation and software ordering service designed to provide users with the publications they need and to keep them current when updates are published. This service is available only to registered users, and each user is allowed only a single set of documentation. Newly registered users are given an introductory subscription to *Interface*, the series of technical notes published for users of the NIH Computer Center and some other orientation publications.

Order your documentation through the World Wide Web. Go to:

http://publications.cit.nih.gov

All publications describing the services and facilities of the NIH Computer Center are kept in stock by the Technical Information Office. If you cannot order a publication online, you may place an order by visiting TASC in Building 12A or by telephone. You may choose to pick up publications yourself or have them picked up by a messenger; placed in your output box, or mailed. Online, telephone, and mail requests are shipped out or put in the user's computer output box, usually within 24 hours.

Publications are distributed in two categories. Manuals that describe basic services and are likely to be updated frequently are automatically sent out to subscribers. All other publications are given out on a request basis. Any revision to a request-basis publication is announced in *Interface* so users can order a copy.

The Technical Information Office maintains a profile of each user's documentation requirements. When a user places an initial order for documentation, an individual profile is established; when the user orders additional publications, they are added to the profile. Each year, all users receiving documentation must renew their subscriptions. This can be done conveniently online through the CIT publication ordering facility; see Section 12.4 for more information.

Anyone making active use of the NIH Computer Center is responsible for obtaining and consulting the publications related to the services being used. This includes inserting updates in manuals when they are received and using the WYLBUR command ENTER NAMES to update the address and telephone information so publication updates can be mailed efficiently. To reduce unnecessary mailings, users should contact the Technical Information Office to drop a publication from their profiles when updates are no longer needed.

User groups with many individuals at a single location are encouraged to establish a library of publications to be shared by the group. A librarian can make certain that the collection is complete and up-to-date. While each user should still subscribe to *Interface*, for timely announcements of changes, the library can keep back issues for reference if needed. Each user may still obtain a personal copy of the publications used most frequently.

Almost all publications are given to users without charge. The NIH Computer Center absorbs the cost in its overhead (which is in turn paid for from computer charges). To be cost effective, some limits must be put on the documentation service. Each user should order only the publications currently needed; if others are needed later, they can be ordered at any time. An order for an unreasonable number of publications (e.g., one of every publication stocked) cannot be filled and will be delayed until the user can be contacted to determine which publications are really necessary. Each request for a special order of documentation is reviewed as it is received. Publications not listed in the online publications system will be given to a user only if the document describes facilities offered at the NIH Computer Center to its user community.

People who are not registered users may receive introductory publications. Requests from non-users for any other NIH Computer Center publications should be directed in writing to the Director, Division of Computer System Services.

6.1 PUBLICATIONS BY CATEGORY

This section lists the categories of manuals available from the Technical Information Office as they are presented in the Web-based CIT publication ordering facility (http://publications.cit.nih.gov). If you are not sure of the category for a manual on a particular topic, you can search the Web-based system by keyword. The categories and manuals in them are subject to change. The designation "(AUTO)" following the name of a manual or set of manuals indicates that updates will be mailed automatically. If an individual manual is ordered from within a set, the updates will not be mailed automatically. The categories of particular interest for users of the OS/390 (MVS) System include:

- General Documentation (includes *Procedures for Deregistration Officials and Account Sponsors*, *Interface*, *Enterprise Open System User's Guide*, *NIH Directory and E-mail Forwarding Service*)
- Security-Related
- PC/Mac Publications & Software
- PARACHUTE Documentation/Software
- SAS Manuals
- IBM Categories
- Computer Center User's Guide
- WYLBUR

- Time Sharing Option (TSO)
- Statistics (SPSS, IMSL, BMDP)
- Batch Processing and JCL
- System Error Messages
- IBM Utilities
- SORT
- Programming Languages
- DB2 (Database Management System)
- Operating System and System Services
- Terminals/Remote Workstations
- VSAM
- IMS (Database Management System)
- Tapes

7 ACCESS TO MAINFRAME SERVICES

This section contains information on network and dialup access to the mainframe services and descriptions of the software products that are supported by the NIH Computer Center to provide that access.

Users with NIHnet connections or Internet (TCP/IP) connectivity should take advantage of the high-speed network connections instead of using slower dialup (modem) connections to access the central services. Contact TASC for connectivity assistance, including software recommendations.

The Online Services Directory (Section 7.1) provides the Internet host names for network connections and the dialup access telephone numbers.

7.1 ONLINE SERVICES DIRECTORY

Figure 7-1. Online Services Directory

Service	Internet Host Name	Dialup Access (301)	Status (301)
OS/390 (MVS) - South			
WYLBUR (network)	**WYLBUR.CU.NIH.GOV**	402-2221	402-2211
2400-19200 bps (dialup)		*800-358-2221	
TSO (network)	**TSO.CU.NIH.GOV**	402-2223	402-2211
2400-19200 bps (dialup)		*800-358-2223	
TSO, DB2, IMS (Full-Screen 3270) (network)	**TN3270.CU.NIH.GOV**	402-2227	402-2211
2400-19200 bps (dialup)			
IBM Batch (RJE Batch)	**N/A**		402-2211
2400-19200 bps		402-2228	
4800 bps		402-2225	
Network File Transfer	**FTP.CU.NIH.GOV**	N/A	N/A
OS/390 (MVS) - North	**AD.CU.NIH.GOV**		402-2211
EBCDIC		443-5100	
RJE Work Station			
4800 bps			
SNA/SDLC/NRZI		443-7475	
4800 bps			
OS/390 (MVS) - Titan (Standard System)	**TN3270.TITAN.NIH.GOV**	N/A	402-2211
Enterprise Open Systems (Unix)			
Compaq/Digital AlphaServers	**EOS.NIH.GOV**	N/A	402-2212
Helix Systems			
SGI Challenge System	**HELIX.NIH.GOV**	402-2222	402-2212
2400-33600 bps		*800-358-2022	
NIH Biowulf Cluster	**BIOWULF.NIH.GOV**	N/A	402-2212
NIHnet access through Parachute	**N/A**	402-6830 *800-827-0124	594-6248

NOTES:
To access 402, 435, 443, 480, 496, 594, or 827 numbers from other 402, 435, 443, 480, 496, 594, or 827 numbers, use only the last 5 digits.
N/A: Not Applicable
All telephone numbers are accessible through FTS.
*These 800 numbers should be used only by persons who do not have access to FTS2000.
International access to theOS/390 (MVS) Systems is available from some foreign countries. See the WYLBUR data set &PUBLIC.PHONES.

7.2 NETWORK ACCESS

Network facilities provide communication between users and remote computer facilities, including accessing the online systems. Network file transfer is discussed in detail in Section 7.4.1. Users with NIHnet or Internet (TCP/IP) connections are encouraged to use network access whenever possible.

NIHnet is a high-speed network backbone that interconnects LANs on and off campus, the NIH Computer Center mainframes, and international data networks. NIHnet connects LANs using TCP/IP, AppleTalk, IPX, and DECnet protocols. It provides remote login and high-speed access to the central facilities, fast file transfer, and local and worldwide mail connections.

Users connected to the Internet can access Enterprise Systems services via the TCP/IP protocol. LAN users experiencing problems should first contact their technical LAN coordinator. See Section 5.2.3 for more information on the role of the technical LAN coordinator. For more information about NIHnet connectivity, 11.1.

Dialup connections to NIHnet are available using Parachute (PPP & Apple Remote Access Control High-speed User Telecommuting Engine), a CIT-supported product. See Section 7.3.3.3 for more information.

Network-related publications are available from the CIT publication ordering facility. See Section 6.

Domain Name Servers

In TCP/IP-based networking, the name server is the networked computer that translates Internet names, such as WYLBUR.CU.NIH.GOV, into the Internet Protocol Address (Internet number or IP number) necessary to make the connection. All connections to CIT TCP/IP-based services should be done through the Internet names, since the numerical IP addresses are subject to change. For example, if a user on the network wants to open a file transfer (FTP) session using anonymous FTP to the NIH Computer Center's mainframe, the person would FTP to FTP.CU.NIH.GOV. The name server then translates that address into the Internet number for the actual FTP session.

NIH users can register a hostname, set up an alias, perform DNS lookups, assign additional IP addresses, and perform other basic DNS changes themselves through the Web. Go to:

http://www.net.nih.gov/DNS

TCP/IP users at NIH should configure their networking software packages (such as QWS3270 PLUS on the PC) to use the name servers in the following order:

	IP Address	Name Server
1	128.231.128.251	ns.nih.gov
2	128.231.64.1	ns2.nih.gov
3	130.14.35.128	lhc.nlm.nih.gov

By having backups for the name servers, TCP/IP network users at NIH can be assured of the most reliable service possible.

7.2.1 OS/390 (MVS) Telnet Servers

All access to CIT services via TCP/IP should be performed using host names (not the numerical IP addresses). See Section 7.1 for the Internet host names for TCP/IP access to online services. The Domain Name Servers at NIH handle the name-to-address conversion for TCP/IP connections. See Section 7.2 for information on Domain Name Servers.

Users on NIHnet or the Internet can use the telnet facilities of TCP/IP to sign on to WYLBUR and TSO.

To access line-by-line WYLBUR and TSO, telnet to the appropriate host name using a personal computer or workstation with TCP/IP capabilities.

- WYLBUR.CU.NIH.GOV is the host name for line-by-line WYLBUR.
- TSO.CU.NIH.GOV is the host name for line-by-line TSO.

Users can access full-screen (3270-type) interactive applications through telnet connections from workstations or personal computers with TN3270 client software. All system and user-written applications that run under TSO can be reached with TN3270 access, including IMPAC, CRISP, and WYLBUR (ENTER MAIL, etc.). In addition, DIMES, a SNA network for HHS, can be accessed via a telnet connection. For additional information see Section 11.3 or refer to the manual *Network Access to the NIH Computer Center's MVS System*.

- TN3270.CU.NIH.GOV is the host name for full-screen services using the TN3270 facility of TCP/IP software. See Section 7.2.2.2 and 7.2.3.1 for additional information.

Users on NIHnet LANs using TCP/IP software can access other computers that are connected to the Internet (such as the NCI Cray in Frederick and the NIH Helix Systems). The telnet facilities of TCP/IP allow NIHnet users to access other Internet computer sites interactively.

The NIH Computer Center supports TCP/IP access to the Enterprise Systems from DOS- and Windows-based personal computers and Macintosh personal computers.

7.2.2 Client Products for TCP/IP Services

In order to access TCP/IP services on a NIHnet-connected workstation, it is necessary to install a compatible communications software package on the workstation itself. High-speed file transfer, remote job submission, 3270 (full-screen) and line-by-line mainframe connections are some of the powerful capabilities currently available using this protocol. While Windows 95, Windows 98, and Windows NT include TCP/IP driver software, DOS and Windows 3.x users need 3rd party software. NIH Macintosh users have a TCP/IP control panel as part of the Macintosh operating system.

7.2.2.1 NetTerm

NetTerm is terminal emulator software for PCs that runs over a TCP/IP connection using the telnet protocol.

Customized for the NIH environment, NetTerm has several pre-configured sessions for connecting to NIH hosts and "QuickButtons" that are mapped to frequently used commands.

This software can be downloaded from the Web. Go to:

http://sdp.cit.nih.gov

and click on NIH TCP Tools. Registered users of the South System must enter their account/initials combination and RACF password. North System users must enter their userid and RACF password. Other NIH staff with NIH IP addresses can also download NetTerm.

Electronic documentation is included with the software under the help menu. If you need additional assistance, contact TASC. This product receives Level 2 support. (See Section 5.1).

7.2.2.2 QWS3270 PLUS for TN3270 Connections

The NIH Computer Center has a site license for QWS3270 PLUS, the commercial version of QWS3270, which provides 3270 (full-screen) terminal emulation for PCs. QWS3270 PLUS is fully compatible with the NIH Computer Center's OS/390 (MVS) systems. This 3270 client software for network connections is available without charge. OS/390 (MVS) South System users can download QWS3270 PLUS from the Web by pointing their browser to:

http://sdp.cit.nih.gov

Contact TASC for additional information. This product receives Level 2 support. (See Section 5.1).

7.2.3 TCP/IP Connectivity for the Macintosh

In order to use a networking application, such as TN3270, Open Transport must be installed on the Macintosh. Open Transport provides a control panel (TCP/IP) that allows users to

configure the Macintosh to their specific networking needs. Open Transport is included with the Mac operating system. Contact TASC for additional information.

A unique IP (Internet) address (number) is needed to configure Open Transport on each individual Macintosh on the network that will be using the TCP/IP protocol. A user can generally acquire the unique IP number by selecting "DHCP Server" in the TCP/IP control panel. An invalid or non-unique IP number can cause problems for the user and for other workstations on the network.

7.2.3.1 TN3270 for the Macintosh

TN3270 allows a Macintosh user, on a LAN connected to NIHnet, to access full-screen Computer Center services, such as DB2, IMS (including DELPRO), ISPF, and DIMES. TN3270 for the Macintosh receives Level 2 support. This software is available from PUBnet, the collection of network services available through NIHnet. PUBnet, which is maintained by CIT, is available through the World Wide Web at:

http://pubnet.nih.gov

7.2.4 LAN SNA Gateways

Workstations and PCs on a LAN equipped with an SNA gateway can effect SNA 3270-type connections equivalent to connections traditionally achieved via 3270 terminals connected to a cluster controller. The LAN SNA gateway is connected via a telecommunication line (usually a 9600 bps leased line) to the NIH Computer Center. Users connected to the LAN communicate with the gateway using a LAN-based communications protocol. The gateway then converts the information coming in from the workstation to SNA/SDLC and, acting as a cluster controller, sends that information over the line to the mainframe. A single communication line connects the LAN and the NIH Computer Center, eliminating the need for individual dialup modems for each workstation.

CIT strongly recommends the use of TN3270 rather than LAN SNA gateways to access DB2, ISPF, IMS, and other full-screen applications. (See Section 7.2.1.) CIT supports a mainframe-to-network print service for printing from full-screen applications. See Section 11.6.1 for additional information.

7.3 DIALUP ACCESS

The facilities of the NIH Computer Center can be accessed by a wide variety of devices serving as interactive terminals. Any personal computer equipped with a modem can be used over telephone lines. The Parachute service allows high-speed dialup access to NIHnet (see Section 11.1). For information on network access to Computer Center services see Section 7.2. Users with NIHnet connections or Internet (TCP/IP) connectivity should use their network connections instead of dialup (modem) connections to access the central services.

Section 7.1 contains the telephone numbers, dialup speeds, and Internet host names for network and dialup access to online systems.

There are only two basic types of terminals although within each type there are many variations:

- ASCII Teletype-compatible—called asynchronous or start/stop because characters are sent one at a time with stop and start signals between them
- 3270-type—called synchronous or full-screen because it appears to the user that screenfuls of information are sent and received.

7.3.1 Line-by-line (Asynchronous) Access

ASCII devices range from standard Teletype terminals to personal computers (such as IBM PCs and Apple Macs). The following is a list of communications settings needed on any ASCII device or PC being used to access WYLBUR or TSO:

- speed of 2400-19200 bytes per second
- dialup line
- half duplex or local echo
- break key function

Additional desirable features:

- 96 character ASCII (64 character can be used)
- 132 character line
- tab function
- backspace function

If you have communications problems due to older terminal emulator software packages that require additional specific settings, contact TASC.

Many personal computers (PCs) can emulate ASCII terminals and communicate with TSO and WYLBUR. For IBM-compatible PCs, the NIH Computer Center supplies the Kermit terminal emulator at no cost. The diskette has a file with installation instructions, and a label on the diskette tells how to read the file. For more information on Kermit, see Section 7.3.3.1.

For information about high-speed access to Computer Center online systems, see below.

SPECIAL CONSIDERATIONS FOR HIGH-SPEED ACCESS

High-speed dialup service is available to users with newer modems that have this capability. Terminal types: ,GEN1P and ,GEN2P which correspond to ,GEN1 and ,GEN2 respectively, are defined to carry out a SET TERM PAGE in stand-alone WYLBUR. Additionally, the NIH Computer Center staff recommends that the ,37 terminal type not be used, because it does not allow WYLBUR to properly "drive" the terminals currently in use. Instead of the ,37 terminal type, the ,GEN1P terminal type should be used.

The major difference in the high-speed service is the system's response when "break" is issued. Because the connection between the mainframe and the new communications processor operates at a higher speed than the connection between the processor and the user's terminal, the output from the mainframe must be buffered. This causes a delay in the output that the user sees on the screen; a user's response at the keyboard could then be misinterpreted by the central processors. Using WYLBUR's SET TERM PAGE command can minimize this problem. For example, 'SET TERM PAGE 20' would cause WYLBUR to pause after every 20 lines of output.

When the SET TERM PAGE command is used in WYLBUR under TSO, listings will pause without a prompt. Pressing ENTER will cause the listing to continue. Issuing a break will cause WYLBUR to terminate the output. Because the output pauses, no additional output will be buffered, thereby alleviating the problem.

Modem Settings

If your terminal emulation package provides support for your modem, it is generally best to use the modem settings provided with the software. MS-Kermit is customized to support high-speed access from a variety of modems. Refer to the Kermit documentation available from the CIT Technical Information Office or through the CIT publication ordering facility.

If your modem is not supported by the terminal emulation package you are using, here are some general guidelines for configuring:

- Hardware (RTS/CTS) flow control should be on and software (Xon/Xoff) flow control should be off.
- Error correction should be on, using V.42 error correction, if possible; otherwise MNP4.
- Compression should be on, using V.42bis, if possible; otherwise MNP5.
- Data Terminal Ready (DTR) control and Carrier Detect (CD) should be set to normal RS232.
- Call Progress Reporting should be on, if available.
- The RS-232 interface (serial port) speed should be fixed. This parameter is sometimes referred to as "buffered mode" or "slave mode."
- Breaks should be sent in line with data, as opposed to expedited. Do not discard data on break.

- If you are using a terminal emulator program other than MS-Kermit, you may need to supply the following strings for WYLBUR and TSO access:

  Initialization: ATE1M1Q0V1X4&B1&C1&D2&N0&W

  Dialing: ATE1&A3&B1&C1&D2&H1&M4&R2DT

Since the specific commands vary from modem to modem, consult your modem manual to implement these settings.

Settings for Terminal Emulators

Speed Considerations

- The terminal emulator should be set initially to use the highest speed your computer can tolerate.

  Windows

  For successful high-speed communications under Windows, it is important that the proper drivers be installed for the serial port. This is typically not a problem with Windows for Workgroups.

  Users need to be sure that the serial port drivers that came with the Windows terminal emulation package were installed. During installation, most packages ask if existing drivers should be replaced with drivers specifically tailored for the product. If you did not accept the drivers that came with the terminal emulation package, we suggest that you reinstall the package and accept those drivers.

  Windows 3.X Environment

  The connection speed should not exceed 9.6 bps. The maximum connection speed for a pentium-based machine is 19.2 bps. Dialup connections via Parachute (see Section 7.3.3.3 or other communications packages should not exceed 19.2 bps.

  Windows95 and WindowsNT

  With Windows95 and WindowsNT you can set the speed to 56 kbs (kilobytes per second) or as high as 115.2 kbs since the drivers for these systems support the higher modem speeds.

- Using the highest speed will allow your modem to use data compression. Since the modem decompresses incoming data before sending it on to your computer, the transmission speed between the modem and the computer can be considerably higher than between the modem on your computer and the modem connected to the mainframe. Depending on your computer's capabilities, you may need to experiment to determine the proper speed. The main factors are:
  - processor speed
  - how many and what kind of memory resident programs are running
  - model of the UART chip, which controls the serial port. Older UART chips (8250 and 16450) might not be able to keep up with higher-speed modems and data could

be lost. Current models of UART chips are in the 16550 series. Also, extensive use of interrupts by memory resident programs would interfere with your communications software's ability to process data.

Flow Control

- Turn software flow control (Xon/Xoff) off.
- Use hardware (RTS/CTS) flow control between the computer and the modem.
- The hardware flow control method to use in MS-Kermit is:
  - RTS/ETX for WYLBUR
  - RTS/CTS for TSO

For further information and assistance, call TASC.

7.3.2 Full-screen (3270) Access

CIT recommends using the TN3270 feature of NIHnet for high-speed network access to 3270-based applications (see Section 7.2.2.2). However, there are slower dialup options available. This section describes other devices for full-screen access to the NIH Computer Center mainframes.

IBM 3270 terminals and compatible devices cannot be ordered through the NIH Computer Center, but must be obtained through standard procurement channels. Users with 3270-type devices can access TSO/VTAM, DB2, and WYLBUR under TSO/VTAM on dialup lines using SNA/SDLC, the System Network Architecture/Synchronous Data Link Control communication protocol. See Section 7.1 for the telephone numbers and dialup speeds for accessing the OS/390 (MVS) System.

A great variety of devices may be advertised as being compatible with the 3270 Display System. In order to be used successfully with the SNA/SDLC protocol, the device must be exactly equivalent to one of the following:

IBM 3276 Model 12, 13, or 14 Controller with the following features:

- 9082 EBCDIC character set 9490 switched network 6302 communications feature without business machine clock
- 3701 external modem interface

IBM 3274 Model 51C with the following features:

- 6302 communications feature without business machine clock
- 3701 external modem interface

Before a dialup connection can be made, each 3270-type device must be registered and the NIH Computer Center's communications software must be modified to accommodate it. A registration form, "Dial-up SNA/SDLC Device Specification Form," is available from TASC. Allow up to four weeks for the necessary software modification. When the device's parameters have been incorporated into the communications software, you will be notified of the proper equipment identification and logon procedure to use.

7.3.3 Dialup Communications Applications

Users of IBM PC-compatible computers and Apple Macintoshes, who do not have NIHnet or Internet connections, can access the OS/390 (MVS) system through dialup communications. This section covers the tools currently supported for dialup connectivity (e.g., Kermit and Parachute for dialup connections to the NIHnet). Network communications from a NIHnet-connected desktop computer to the NIH Computer Center is discussed in Sections 7.2 and 7.4.1. There are many other commercially available software packages for dialup connections.

7.3.3.1 Kermit

The Kermit file transfer package includes a reliable terminal emulation package. The MS-Kermit part of the NIH Kermit package allows users to use their PCs in DEC VT102, VT320, or VT300 terminal mode to access WYLBUR, TSO/TCAM and the Helix Systems. Tektronix 4010 emulation is also available. Full-screen applications (e.g., DB2, ISPF, SAS) can be accessed by using Kermit in conjunction with the Protocol Conversion Facility. The NIH Computer Center has established predefined CALL commands (CALL WYLBUR, CALL TSO, and CALL 3270) to assist users. The KERMGEN configuration program generates scripts for high-speed, error-correcting modems to allow access to high-speed TSO and WYLBUR lines. See 7.4.2.1 for information on using Kermit for file transfers. While TSO-Kermit (running on the mainframe) receives Level 1 support, MS-Kermit (running on the user's workstation) receives Level 2 support. See Section 5.1for information on software support.

Since the NIH Computer Center's TSO-Kermit is tested with the CIT-supplied version of the Kermit software (and installation parameters) on the PC, problems may occur with other versions. For this reason, users should acquire and use the version provided by the Technical Information Office. This is the only version that receives consulting support (TASC, Service Request Tickets, etc.). All other versions are unsupported and are solely the responsibility of the user. If you must use another version of Kermit, check carefully the required parameter settings that are given in *Using TSO-Kermit at NIH*.

There are a variety of implementations of Kermit available from other sources. Most of these Kermits should be able to communicate and transfer data with TSO-Kermit, but they receive no Computer Center support, and problems that arise are wholly the responsibility of the user. Unsupported implementations may cease working without warning since Computer Center changes are announced in advance only if they affect supported products.

Kermit documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

7.3.3.2 Protocol Conversion Facility

> The Protocol Conversion Facility will be retired from service after January 28, 2001.

The Protocol Conversion Facility allows many ASCII terminals to access full-screen (3270-type) applications such as DB2, ISPF, IMS, and SAS/FSP. The Protocol Conversion Facility receives Level 2 software support from the NIH Computer Center (see Section 5.1).

Access to full-screen 3270-type applications can also be performed via high-speed network connections using the TN3270 feature of software that supports TCP/IP; see Section 7.2.1 for details.

The Protocol Conversion Facility supports translators for each of the terminals listed below:

Anderson Jacobson 510, 520
Datagraphix 132-2
DEC VT52, VT100, VT220
Hayes Smartcom
IBM 3101
LEAR ADM 3A
NIH 8188 (Megadata)
TAB 132-15
Tektronix 4023, 4025, 4105, 4107, 8500
Keyboard Printer (KPTR)

Many other models of ASCII display terminals, as well as personal computers, can also be used successfully with the Protocol Conversion Facility. The manual addresses this issue and provides guidelines for determining which translator is best suited to a particular device type.

The Protocol Conversion Facility documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

7.3.3.3 Parachute

Dialup access to NIHnet is available through Parachute, a service sponsored by CIT. Parachute (PPP & Apple Remote Access Central Highspeed User Telecommuting Engine) allows users to connect remotely, using a modem and a phone line, to a central server on the NIH wide-area network (NIHnet). Using Parachute, NIHnet and Internet services such as the Central Email Service, the OS/390 (MVS) System, Helix Services, and the World Wide Web can be accessed at modem speeds and using high-speed remote technologies.

To apply for Parachute service, a customer:

- must be registered to a CIT account (If you do not currently have an account—or if you are uncertain whether you have an account or who your account sponsor is—contact TASC.)
- must be an NIH employee or contractor
- must have a valid business reason for needing this service

As with all other CIT services, an application for Parachute service requires approval of the account sponsor. The sponsor can request Parachute service for a user via Web Sponsor at:

http://silk.nih.gov/sponsor/homepage

For more information about Parachute, go to:

http://parachute.nih.gov

For information on a variety of high-speed remote access technologies, go to:

http://remoteaccess.nih.gov

For further information, send e-mail to tasc@nih.gov, or call TASC.

7.4 FILE TRANSFER AND DATA EXCHANGE

This section describes various methods of transferring data between desktop computers and the OS/390 (MVS) mainframes and between NIH and other computer centers.

7.4.1 Network File Transfer

There are several mechanisms for transferring files to and from the OS/390 (MVS) System via NIHnet. The methods available for file transfer from a TCP/IP-based LAN include FTP (File Transfer Protocol), anonymous FTP, and submitting batch jobs as files via FTP.

7.4.1.1 File Transfer Using TCP/IP

File transfer between a workstation on a NIHnet connected LAN running TCP/IP software and the OS/390 (MVS) System is provided through software that has the File Transfer Protocol (FTP) capability. For FTP access, use FTP.CU.NIH.GOV the host name of the FTP server on the OS/390 (MVS) South System.

Users on TCP/IP-based LANs connected to NIHnet can transfer files in either direction (i.e., to the mainframe, or from the mainframe to their workstations). Unix workstations can also transfer files to and from the OS/390 (MVS) System using appropriate FTP software packages.

The speed with which FTP transfers files makes FTP the file transfer mechanism of choice for networked Computer Center users. Files that are to be downloaded via FTP from the NIH Computer Center should be stored on the mainframe in **non-edit** format. Data sets that are stored in WYLBUR's edit format will not be automatically converted to ASCII text files when downloaded via FTP to a desktop computer or workstation. Use the WYLBUR SAVE (or RESAVE) command with the VARIABLE option to specify non-edit format rather than the default (edit format). For example:

```
save as myfile variable
```

Other computers that are connected to the Internet (such as the NCI Cray in Frederick, the NIH Helix Systems, the North System, etc.) can be accessed by users on NIHnet LANs using TCP/IP software. The FTP facilities of TCP/IP provide high-speed file transfer between a user's workstation and another Internet site.

Contact TASC for recommendations on client products for TCP/IP-based file transfer.

WS_FTP Pro
WS_FTP Pro, based on the file transfer protocol (FTP), provides fast and accurate transfer of files or collections of files between Internet-connected computers using Windows 95/98/NT.

WS_FTP Pro has been customized with pre-configured sessions for the major NIH computer systems. The installation program installs two interfaces—"Classic" and "Explorer." If you connect to the OS/390 (MVS) South System, use the classic interface (the icon labeled WS_FTP Pro). This interface provides the best display of file names and allows you to use the QUOTE and SITE commands.

For security reasons, we recommend that you don’t allow WS_FTP Pro to encrypt and store your password in its .ini file.

This software can be downloaded from the Web. Go to:

http://sdp.cit.nih.gov

and click on NIH TCP Tools. Registered users of the South System must login enter their account/initials combination and RACF password. North System users must enter their userid and RACF password. Other NIH staff with NIH IP addresses can also download WS_FTP Pro.

Electronic documentation is included with the software, under the help menu. If you need additional assistance, contact TASC. This product receives Level 2 support. (See Section 5.1).

7.4.1.2 Anonymous FTP Using TCP/IP via FTP

Users of the NIH Computer Center can make files available to TCP/IP users through "anonymous FTP." To access data sets in anonymous FTP directories, you must be on NIHnet or the Internet and using a personal computer, workstation, or other host computer with TCP/IP software. Simply FTP to FTP.CU.NIH.GOV. When asked for a userid, specify ANONYMOUS. At the PASSWORD prompt, press ENTER. To display a list of all FTP directories and their descriptions, use the DIR command. To see what files are available in a specific directory, specify the directory name as an operand on the DIR command.

Users can also access anonymous FTP files during a non-anonymous FTP session (that is, one where the account/initials combination is specified) by switching to the anonymous directory (CD /ANONYMOUS).

Any registered user of the NIH Computer Center can establish an anonymous FTP directory. This anonymous FTP directory allows people to get files from the directory, put files into the directory, or both. The person creating the directory specifies which FTP facilities are to be available.

WYLBUR's ENTER FTP command is used to create, modify, or remove an anonymous FTP directory. To create a directory, the user must supply the following pieces of information:

- directory name—up to 20 characters long—is used in FTP commands by people signing on to anonymous FTP to get and/or put files.
- directory description—a maximum of 60 characters long—describes the general content of files in the FTP directory.
- data set name prefix—up to 43 characters long (specified as you would specify a data set name in WYLBUR)—determines which data sets are members of the directory.
- If users are allowed to download files, then all cataloged data sets beginning with that prefix will be accessible through that directory.
- If users are allowed to upload files, then all uploaded data sets will begin with that prefix.
- If a data set name prefix for an FTP directory begins with a different account and initials combination than the one used to sign on to WYLBUR, the user will be prompted for the keyword for that account and initials.
- verification of the ability to get files from the directory and/or put files into the directory.

To get a file, specify the complete file name (that is, directory name and file name) on the FTP GET command. For example, a file named JAN01 that resides in the directory named BIOMETRICS; the command GET BIOMETRICS.JAN01 is used to download the file.

7.4.1.3 Submitting Batch Jobs via FTP

To send a JCL file to the NIH OS/390 (MVS) FTP server for submission as a batch job:

- Issue the QUOTE SITE SUBMIT command from the workstation. The QUOTE SITE SUBMIT command tells the NIH OS/390 (MVS) FTP server that the next file uploaded to the mainframe should be submitted as a batch job. If QUOTE is not a valid FTP command for the FTP package running on your workstation, refer to that package's documentation.
- Use the SEND or PUT command to send the JCL file to the OS/390 (MVS) mainframe. When sending the JCL file, the workstation FTP package may prompt you for a name for the file on the NIH OS/390 (MVS) mainframe. The response given at that point will be ignored by the NIH OS/390 (MVS) FTP server, which will submit the JCL as a batch job anyway.

Batch jobs submitted via the QUOTE SITE SUBMIT command must include in their JCL all the appropriate control statements. The FTP server, unlike WYLBUR, does not insert keywords or other JES2 control statements. A job that does not contain the correct /*KEYWORD statement will be rejected by the mainframe. Other JES2 control statements, such as /*ROUTE PRINT HOLD, which sends job output to OUTPUT HOLD instead of the printer, may be useful also. JES2 control statements are documented the manual *Batch Processing and Utilities at the NIH Computer Center*.

The facilities available via FTP are described in detail in the manual *Network Access to the NIH Computer Center's MVS System*.

7.4.2 Dialup File Transfer

Dialup file transfer is a slower method of transferring files from desktop computers to the mainframes.

7.4.2.1 Kermit

The Kermit file transfer package is widely used for transferring files and data among different computers. The NIH Computer Center currently supports MS-Kermit release 3.14+NIH4. Kermit is available on diskettes. At NIH, users of IBM personal computers and compatibles can use Kermit to access the OS/390 (MVS) System and the Helix Systems using a low-cost asynchronous connection. An error checking and correcting protocol makes sure that the data being transferred is received completely and correctly. The KERMGEN configuration program generates scripts for high-speed, error-correcting modems to allow access to high-speed TSO and WYLBUR lines. Information on using Kermit as a terminal emulator is found in Section 7.3.3.1. Kermit documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications. MS-Kermit receives Level 2 support.

7.4.3 Host-to-Host File Transfer

NJE (Network Job Entry) Files can be transferred between the NIH Computer Center and other computer centers using host-to-host file transfer. This type of file transfer is performed using two batch programs—SENDFILE and RCVFILE.

These programs can perform the file transfer under the following conditions:

- The other site (computer center) must be defined to NIH as a JES2 NJE node; i.e., it must be an OS/390 (MVS) JES2 or JES3 node, a VM RSCS node, or a VSE POWER node.
- The other site must have the NIH Computer Center-written SENDFILE and RCVFILE programs (or equivalent programs for VM or VSE).
- Users transferring a file must be authorized to use both the sending and receiving site.

For more information on SENDFILE and RCVFILE and the sites that support this type of file transfer, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

7.4.4 Exchanging Disk Data with Other Computer Centers

Disk data may be transferred between NIH and other computer centers via tape; disks cannot be exchanged. Refer to the manual *Using Tapes at NIH* for information on how to handle tapes coming to and from the NIH Computer Center. This section is concerned with the general nature of the disk data to be transferred.

While it may be necessary at times to re-create a disk at NIH from a dump tape generated at another computer center, there are serious disadvantages to this technique. The ADSRECOV procedure is the only one that can be used to recover the contents of a disk from a dump tape created at another computer center. Restoring directly to an NIH disk (e.g., using DISKGET) is not permitted because changes in VTOC placement would cause severe system problems. ADSRECOV and DISKGET are described in the manual *Batch Processing and Utilities at the NIH Computer Center*.

Even using ADSRECOV has serious limitations. For the restore to work, the software used to dump the disk at the sending installation must be compatible with the restore software that is used by ADSRECOV, and the disks themselves must be compatible. Because new models of disks may be introduced and old ones discontinued, it is particularly important not to base any continuing data exchange on such a device-dependent strategy. The NIH Computer Center has no capability to read backup tapes for disk types not currently in use at this installation. Whenever possible, data sets should be copied individually to tape and sent to the NIH Computer Center where they can be then copied to a disk.

Similar problems may be encountered when transferring disk data from NIH to other computer centers. Before using DISKEXPT to create a backup tape to be restored at the other center, make sure that the disk models and software are compatible. If an incompatibility exists, the data sets must be individually copied to tape and recopied to disk using software

that is compatible between the computer centers. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for information on DISKEXPT.

In addition to exchanging tapes, there are other file transfer mechanisms available. See Section 7.4.1 for information on high-speed file transfer for NIHnet-connected workstations. Host-to-host file transfer is described in Section 7.4.3. Mainframe electronic mail can be used to send and receive data files no larger than 1 megabyte (see Section 12.1). Data can also be downloaded to a floppy disk on a personal computer with file transfer software and uploaded to another mainframe. (For information on the NIH Computer Center's dialup file transfer facilities, see Section 7.4.2.)

The NIH Computer Center does not offer long-term archival storage. All data media (disk and tape) are for storage of active data (used at less than 18-month intervals). For permanent archiving service, the data must be put on a tape and sent to a Federal Records Center or the National Archives. This transfer must be arranged through the user's Administrative Office. For directions on how to remove a tape from the library, see *Using Tapes at NIH*.

7.4.5 CONNECT:Direct

CONNECT:Direct, a product that provides host-to-host file transfer, is required by the Department of the Treasury for online financial transactions with their systems. The function it provides is similar to that of the SENDFILE and RCVFILE programs (described in the manual *Batch Processing and Utilities at the NIH Computer Center*) but it is easier to use. CONNECT:Direct monitors the progress of the file transfer.

CONNECT:Direct must be installed at the remote site as well as at NIH, and requires either a VTAM or TCP/IP connection between the two sites. CONNECT:Direct is controlled by a process that is similar to a JCL procedure. Once the process is written, the user needs only to supply the values for various parameters. The two parameters used most are the source data set name and the target data set name.

CONNECT:Direct requires coordination with another site as well as modifications to certain CONNECT:Direct configuration files. Users wishing to set up a new CONNECT:Direct application must first register by contacting TASC and supply them with the following information:

- the destination of the data to be transmitted
- the nature of the data to be transmitted
- the amount and frequency of the transmitted data

Each project must have a Data Transmission Administrator (DTA) who is responsible for setting up and maintaining both the jobs and the CONNECT:Direct processes required to transmit the data. All correspondence regarding a registered CONNECT:Direct project should specify the name, user initials, and phone number of the DTA.

The CONNECT:Direct manual is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

7.4.6 3270 File Transfer Using IND$FILE

Many PC 3270 emulation packages support file transfer between the host and the PC if a program named IND$FILE is installed on the host. This IBM program, available under TSO, receives Level 2 support. IND$FILE has been successfully tested with such packages as the IBM PC 3270 Emulation Program, EXTRA by Attachmate, and IRMAremote for Hayes AutoSync by DCA.

The use of IND$FILE for 3270 file transfer requires specific software on the PC. Because the use of IND$FILE in most 3270 emulation packages is transparent to the user, it is not necessary to know how to use it, only that it is available if the software requires it. Since most asynchronous communications packages such as MS-Kermit do not include this software, IND$FILE generally cannot be used with the NIH Protocol Conversion Facility.

When using a 3270 emulation package that uses IND$FILE, it may also be necessary to specify "logmode" in the TSO logon sequence, as in the following example,

```
TSO 'aaaaiii/NONE/bbb 3270',LOGMODE=E3278M2
```

where "aaaaiii" is your account and initials combination, and "bbb" is the box number for output. The LOGMODE option tells the mainframe that your PC is capable of doing the file transfer.

7.4.7 Exchanging Tapes with Other Installations

Tape is the preferred medium for transporting large data files from one installation to another because RAMAC (logical 3390) disks cannot be transferred. Whether exporting or importing data, it is very important to ensure that the receiving installation has the type of drive capable of processing the tape, especially cartridge tapes. For complete information on exchanging tapes with other installations refer to *Using Tapes at NIH* which can be ordered through the CIT publication ordering facility.

7.4.8 Factors Influencing Time and Cost of File Transfer

There are many situations where it is important to be able to estimate the time or the cost of transferring a file between the NIH Computer Center and a workstation. Factors that significantly affect the elapsed time it takes to transfer a file are:

- Number of bytes in the file - file transfer time is directly proportional to the total number of bytes in the file. The larger the file is, the longer it will take.
- The speed of the connection - If a file can be transferred in a certain amount of time at 19200 bps, the transfer can be expected to take and four times as long at 4800 bps and

eight times as long at 2400 bps,. (Clearly, reducing file transfer times can be the easiest way to justify the cost of a high-speed modem or a network connection.)

- The type of data (character or binary) - Binary data transfers take longer, because it is necessary to send extra codes to identify the binary characters.
- The packet length used - The use of long packets (on the order of 1000 bytes) instead of short packets (94 bytes) means that the information used to check for errors in the transmitted data is sent much less frequently. With telephone lines that are relatively noise-free, this can reduce the total transfer time by as much as 50%.
- Strings of repeating bytes in the file - MS-Kermit automatically compresses strings of repeating bytes before sending them and then expands them after they are received. This reduces the total number of characters that need to be sent and can reduce the transfer time dramatically. Thus "sparse" data files, in which there are many strings of blanks (or zeroes, etc.), will transfer more quickly than files that are full of data.

Factors that significantly affect the cost of file transfer are:

- The total number of bytes in a file - file transfer cost is directly proportional to the total number of bytes in the file. The larger the file is, the more it will cost.
- The packet length used - The use of long packets instead of short packets can reduce the total transfer cost by as much as 50%.
- Strings of repeating bytes in the file - Kermit's ability to compress such strings can reduce the cost of transferring a file, although the cost savings is not nearly as dramatic as the time savings.
- The time of day-60% rate reductions are available during DISCOUNT hours. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for information about running a batch job with a /*DISCOUNT statement.

The following factors do not appear to influence file transfer times or costs:

- type of desktop computer
- brand of modem (Hayes, AT&T, etc.)
- type of workstation disk (diskette, fixed disk, network file server)
- DCB characteristics (RECFM, LRECL, BLKSIZE, etc.) of the file on the mainframe

Since both file transfer time and cost are directly proportional to the total number of bytes in the file to be transferred, the following procedure provides a rough but generally accurate estimate of the transfer time or cost for any given file:

- Obtain a small sample of the data to be transferred. If the data file does not yet exist, create a sample containing fictitious data.
- Transfer the file and record the transfer time and cost.

- Divide the size of the sample file (in bytes) by the total elapsed time (in seconds) to get the data transfer rate (in bytes per second).
- Divide the size of the sample file (in megabytes) by the total session cost to get the transfer charging rate (in dollars per megabyte).
- To estimate the time of transferring a file, simply multiply the size of the file (in bytes) by the data transfer rate calculated above. To estimate the cost of a file transfer, multiply the size of the file (in MB) by the transfer charging rate calculated above.

8 MAJOR SYSTEMS AND DEVELOPMENT FACILITIES

The NIH Computer Center offers a wide range of major systems and development facilities to its users. This includes terminal systems, database systems, client/server products, World Wide Web facilities, and programming languages.

8.1 OPERATING SYSTEMS

The NIH Computer Center Enterprise Systems offer the System 390 computing platform, open systems (Unix-based), and Windows NT/2000-based services.

8.1.1 OS/390 (MVS) System

CIT has developed an OS/390 (MVS) "standard system" (called Titan) that will ultimately replace both the current North and South Systems. Initial migrations to this system will begin towards the end of year 2000. For more information on this system visit:

http://silk.nih.gov/silk/titan

The systems software servicing the OS/390 (MVS) facility is composed of the IBM MVS/ESA (Multiple Virtual Storage/Enterprise System Architecture Operating System) and the JES2 NJE (Job Entry Subsystem 2 Network Job Entry). JES2 NJE allows selected jobs, operator commands, messages, SYSOUT data sets, and accounting information to be processed by the multiple processor complexes locally, to be transmitted to other nodes connected by telecommunication lines. These systems may be located at the same site or at geographically separate sites.

MVS/ESA, now named OS/390 by IBM, vastly expands the address space that can be available to each task and uses the computer's memory more efficiently than non-virtual systems. This is possible since only the active portions of programs are kept in real memory. JES2 acts as the batch job scheduler and controller for the OS/390 operating system. OS/390 allows the creation of multiple, data only address spaces (called "data spaces") of up to 2 billion bytes of virtual storage. OS/390 substantially enhances the reliability, availability, and serviceability characteristics of the operating system.

This complex operating system presents a unified system interface to the user. Shared files and work queues make it possible to balance the workloads of the various subsystems and to permit service to resume promptly even if one machine is out of service for an extended period of time. This is done by switching the services usually provided by the failing machine to the others.

8.1.1.1 Cross-System Enqueue

The cross-system enqueue software in use at the NIH Computer Center is MIM (Multi-Image Manager) from Computer Associates. It provides automatic data set integrity protection in a multi-processor environment, preventing accidental destruction of data from jobs or terminal sessions modifying any data set with the same name at the same time.

Jobs that require access to a data set that is being referenced in a manner that allows it to be created or updated will be suspended until the controlling job or session relinquishes control. Since the cross-system enqueue software does not check for volume information, access to all data sets with the same dsname will also be suspended. Because the suspension of job execution ties up system resources and consequently degrades the system throughput, jobs in suspension for over 30 minutes are canceled automatically. This problem can be avoided by using the /*CNTL, /*AFTER, and /*BEFORE facilities which keep the jobs awaiting execution rather than suspending job execution after it has already begun. For details on avoiding data set contention problems, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

8.1.1.2 Software Features Not Permitted at NIH

System libraries and software modules will not be updated or changed to accommodate user software. Also, user software is not permitted to use any means (e.g., CALL, ATTACH, LINK) to invoke compilers, system modules, or the Program Management Binder unless Computer Center documentation specifically permits such access. These restrictions are necessary to preserve the integrity and dependability of the operating system.

The creation of unmovable data sets on disk is not permitted.

The following facilities incorporated in the OS/390 (MVS) operating system cannot be used at the NIH Computer Center because they are not supported or their use may cause performance problems:

Checkpoint/Restart
Retention Date
Expiration Date
MVS Password Protection
Absolute Track Allocation
Reserve/Release Macros
WTO/WTOR Macros
APF Facilities*
SSCT*
Special SVCs*
Special SMF Exits

* Contact the NIH Computer Center through TASC concerning the use of these facilities.

RACF ERASE option of ADDSD and ALTDSD
ERASE option of any AMS command
TSO as a batch job
SUPER ZAP*

No list of exceptions can be complete. The *NIH Computer Center User's Guide* documents the software facilities to be used at the NIH Computer Center. Occasionally a user will discover a non-supported feature in a Computer Center supported product that works or appears to work, and will integrate it into an application. Such a user runs the risk that the non-supported feature will suddenly not work at all, or worse yet will appear to work but will actually produce erroneous results. Before using a facility not mentioned in Computer Center documentation, submit a Service Request Ticket (see Section 8.1.1.2) to make certain it is allowed. In many cases an alternative technique is supported.

Having software send information about the application to the machine room operator's console is forbidden.

Under no circumstances should a user access system data sets (e.g., system libraries, disk VTOCs) with any software other than that supplied by the NIH Computer Center and described in the manual *Batch Processing and Utilities at the NIH Computer Center*. Formal action will be taken against anyone who attempts to circumvent protection software and threatens the security of accounts or data.

It is against Computer Center policy to permit use of the system as a recreational facility; CIT will take immediate action against anyone found using its resources to play computer games, even in learning situations. For further details on restrictions against use of computers for personal and recreational use, see Section 1.5.

Because the printed output format of Computer Center utilities is subject to change without notice, software should not be designed to depend on such output. For information on utility restrictions, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

Consult Section 10.4 for a summary of the job control language features that cannot be used at this computer center.

8.1.2 Open Systems

The open systems components of the NIH Computer Center Enterprise Systems include the Enterprise Open Systems (EOS), a Unix-based computing environment, and the Unix System Services (USS) subsystem of the OS/390 operating system.

* Contact the NIH Computer Center through TASC concerning the use of these facilities.

8.1.2.1 Unix (Tru64 UNIX)

The NIH Computer Center hosts a variety of production and development applications on the Enterprise Open Systems (EOS). Compaq/Digital AlphaServers provide the base for the EOS environment for client/server (i.e., Unix-based) applications. For additional information, send e-mail to silkweb@list.nih.gov or visit:

http://datacenter.cit.nih.gov/eos

8.1.2.2 Unix System Services (USS)

The Unix System Services (USS) component of the OS/390 (MVS) System will offer significant enhancements in the open systems arena. USS includes the POSIX programming environment.

8.1.3 Windows NT/2000 Application Servers

Windows NT and Windows 2000-based applications can be hosted on CIT Intel-based servers that are maintained and monitored on a 7 x 24 basis. This facility provides a computing environment suitable for critical, enterprise-wide applications. For more information, visit:

http://datacenter.cit.nih.gov/nt

8.2 TERMINAL SYSTEMS

This section describes the terminal systems that are supported by the OS/390 (MVS) Enterprise System.

8.2.1 WYLBUR

The date for the complete retirement of WYLBUR has not yet been determined. A version of WYLBUR will eventually be placed on the OS/390 (MVS) "standard system" (called Titan). CIT encourages users to consider alternative long-term strategies through the WYLBUR Transition Working Group. Refer to *Interface* for information related to WYLBUR.

To keep informed about WYLBUR retirement issues and to join the RETIRE-WYL listserv list go to:

http://silk.nih.gov/silk/retirewyl

WYLBUR is an interactive computer system for accessing online Computer Center services, batch job entry and tracking, electronic mail, internetwork communications, coding and execution of command procedures, text editing, and document formatting.

WYLBUR documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

The services of NIH Extended WYLBUR, the version in use at the NIH Computer Center, are available to registered users via dialup or NIHnet connections. See Section 8.2.1.1 for access information. WYLBUR has its own terminal communications program, named MILTEN, which is normally transparent to users. WYLBUR is also available under both TSO/TCAM and TSO/VTAM, including TSO accessed via TN3270 using NIHnet. In addition to its usefulness to TSO users, TSO/WYLBUR may be a suitable substitute in the rare occasions when WYLBUR is temporarily unavailable.

The ENTER command in WYLBUR is used to access many command procedures written by the NIH Computer Center staff to enhance its services and technologies. Many of these services are described in detail elsewhere in this manual. They include:

DISKCALC	Compute optimal BLKSIZE for disk data sets
FILE	Add text to a mail file
FTP	Create, modify, or remove an anonymous FTP directory
MAIL	Electronic mail and file handling
NAMES	Access the list of user names and initials
PDSLIST	Submit a batch job to list the contents of all the members of a PDS
PHONE	Search the NIH and Computer Center phone directories
RECALL	Submit a batch job to recall a data set from MIGRAT
RECOVER	Recover a backup copy of a data set on a dedicated disk
RESTORE	Restore a backup or migrated copy of a FILE data set
SENDMAIL	Send Internet and/or WYLBUR mail
SUBMIT	Schedule automatic submission of recurring batch jobs
TAPECALC	Compute optimal BLKSIZE for tape storage

WYLBUR's job entry facilities allow the user to submit a computer program to the batch job stream, to track the progress of the job, and to examine the output at a terminal. WYLBUR also has an off-line listing feature for producing hardcopy listings of text on the central printers (using a variety of forms and character sets) or on remote printers at the user's site. Also, a WYLBUR procedure is available for execution in the batch, providing a handy way to perform lengthy or repetitive tasks automatically. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

WYLBUR's command procedure facility is a programming language with the ability to execute collections of stored WYLBUR commands and programming statements (e.g., IF...THEN...ELSE, CASE, variables, string manipulations). The NIH Computer Center

provides many service facilities for users via the sophisticated command procedure programs that are part of the ENTER command.

The editing features of WYLBUR provide an easy-to-use mechanism for creating, changing, searching and displaying all kinds of text, such as computer programs and data, letters, proposals, reports, manuals, and lists. Between sessions, data sets can be stored on online disks (see Section 13.1).

The document formatting facility has capabilities such as making the lengths of text lines even; automatically dividing the text into pages; and generating page numbers, headings, footings, tables of contents, and indices.

A 3-character keyword is used for some WYLBUR functions (e.g., SAVE, SCRATCH, RUN, FETCH, SET JOB, PURGE) and the /*KEYWORD statement in batch jobs. See Section 4.6 for information on keywords.

To provide rapid response for the large community of users who access WYLBUR, two separate processor complexes are used. They function identically and both are reached by the same telephone number (given in Section 7.1); however, it is possible for one processor complex to fail while the other is still functioning normally. If this happens, users who were on the processor complex that failed will not be able to sign-on to WYLBUR again until the recovery data sets are built. During this time (usually 20-30 minutes), any user trying to log back on will receive the "already logged on" message.

The automatic logoff interval for WYLBUR, following a period of inactivity, is 4 hours. The user receives an initial warning on the screen after 3 hours and 50 minutes of inactivity, a second warning 5 minutes later, and a forced logoff in 5 more minutes.

8.2.1.1 Signing on to WYLBUR

Network Access

Network access to WYLBUR is available via NIHnet. Users with workstations on NIHnet-connected LANs and TCP/IP software can telnet to WYLBUR.CU.NIH.GOV for high-speed access to line-by-line WYLBUR. The TN3270 feature of TCP/IP allows users to telnet to TN3270.CU.NIH.GOV to access full-screen WYLBUR under TSO by using the TSO WYLBUR command. For more information about network-based interactive access, see Section 7.2.

Dialup Access

For dialup access to WYLBUR, you need a workstation with a terminal emulation package, and a modem. A wide variety of terminal emulation packages have been used to communicate with WYLBUR; if you have an IBM-compatible PC, the Technical Information Office will supply the Kermit terminal emulator at no cost.

Refer to Section 7.3.1 for the communications settings for terminal emulation software packages. Once the terminal emulator has been configured, simply dial the appropriate

number (see Section 7.1), and you are ready to identify yourself. Each user is identified by a registered account and initials combination. You will also be prompted for your password. See Section 4.5.2 for information on RACF passwords.

In the following example, a user with registered initials "iii," account "aaaa," and a RACF password of "pppppppp" is signing on. The user's reply is shown in lower case print. The Enter key (ENTER) on the keyboard is pressed after each response.

```
CONNECTED (this may vary by modem)
,Kermit2(ENTER)

(some informational messages may be displayed)
INITIALS? iii(ENTER)
ACCOUNT? aaaa(ENTER)
ENTER RACF PASSWORD FOR RACFID III
PASSWORD? pppppppp(ENTER)
?
```

WYLBUR's question mark (?) prompt indicates that WYLBUR is ready to receive a command. For more information on using WYLBUR, see the *WYLBUR Fundamentals* manual.

8.2.2 TSO

The IBM Time Sharing Option (TSO) permits a user to interact with a program while it is executing. The version available at NIH is Time Sharing Option Extensions (TSO/E). By entering the appropriate TSO commands, a user can easily develop, test, and debug programs written in a variety of programming languages, including FORTRAN, COBOL, PL/I and Assembler. With this general purpose timesharing system, a programmer may control a program's processing by directing its output to a terminal and providing its input via the keyboard.

TSO documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

In addition, a number of subsystems and facilities are installed to function under TSO. They are:

- TSO/WYLBUR - a line-oriented text editor.
- Kermit - a file transfer system that enables data exchange between PCs and the Computer Center's mainframe computers.
- ISPF - facilities to simplify the development of interactive applications under TSO.
    - MAX - a collection of data and file manipulation programmer tools for use under ISPF.

- REXX/370 - a complete application development programming language that provides structured programming techniques, logical and arithmetic operations, and communications with the TSO end user. Other features include: coding that is largely format free, convenient built-in functions, debugging capabilities, interpretive execution (no compilation necessary), and extensive parsing capabilities for character manipulation.
    - The REXX/370 Compiler and Library provide a common user application interface so that REXX applications can be ported between OS/390 (MVS), OS/2, and VM/CMS systems.
    - CLIST - a command language for driving interactive programs.

TSO at NIH has two terminal handlers—TSO/TCAM, for most terminals, and TSO/VTAM for 3270-type terminals. The ISPF software supports 3270-type terminal applications.

TSO enables the user to manipulate files from a terminal. All data files to be accessed must be stored on the online disks. Data sets created under TSO are placed on the FILE management class unless this default is overridden. (All access methods valid for the language being used are supported under TSO.) TSO cannot access WYLBUR edit format data sets. TSO can process data sets saved from WYLBUR only if they are not in edit format (CARD, PRINT, or TSO format will work).

A three-character keyword is used for some TSO functions (e.g., the ALLOCATE and SUBMIT commands). For information about keywords, see Section 4.6.

TSO is available only as an interactive system; TSO as a batch job is not supported. TSO should be used for applications that allow the user to interact reasonably with the program. A program is inappropriate for TSO if it asks a user to enter some data and then begins extensive file searches involving large amounts of I/O or begins lengthy computations consuming large amounts of CPU time. Such applications are more expensive in TSO than in the batch.

When using WYLBUR under TSO, each user executes an individual copy of WYLBUR. TSO/WYLBUR costs a little more to use than WYLBUR because of the additional overhead involved in establishing and controlling a separate copy of WYLBUR.

An online HELP data set provides users with up-to-date information about any TSO command, subcommand, or operand.

When a TSO session unexpectedly ends (due to a modem line drop, for example), the user has 10 minutes to reconnect to that session. To reconnect, re-establish communications with TSO, then type

```
LOGON aaaaiii RECONNECT
```

where "aaaaiii" corresponds to the account and registered initials. If the session is not reconnected within 10 minutes, the session is automatically terminated, after which time the user would need to go through the complete logon process.

The automatic logoff interval for TSO, following a period of inactivity, is 4 hours. The user receives an initial warning on the screen after 3 hours and 50 minutes of inactivity, a second warning 5 minutes later, and a forced logoff in 5 more minutes.

8.2.2.1 Logging on to TSO

Network Access

For network access to line-by-line TSO via NIHnet you need a workstation on a NIHnet-connected LAN and TCP/IP software. Telnet to TSO.CU.NIH.GOV for line-by-line TSO. For network access to full-screen TSO via NIHnet, use TCP/IP software for TN3270. With TN3270 you can telnet to TN3270.CU.NIH.GOV to access full-screen applications using TSO/VTAM. Users with TCP/IP client software that does not support TN3270 can use QWS3270 PLUS. For more information on network-based, interactive access, see Section 7.2.1.

Dialup Access

For dialup access to TSO, you need a workstation with a terminal emulation package, and a modem. A wide variety of terminal emulation packages have been used to communicate with WYLBUR; if you have an IBM-compatible PC, the Technical Information Office will supply the Kermit terminal emulator at no cost. For more information on Kermit, see Section 7.3.3.1.

Refer to Section 7.3.1 for the communications settings for terminal emulation software packages. Once the terminal emulator has been configured, simply dial the appropriate number (see Section 7.1, and you are ready to identify yourself. Each user is identified by a registered account and initials combination, and a RACF password. For information concerning passwords, refer to Section 4.5.2.

In the following example, a user with registered initials "iii," account "aaaa," and a RACF password of "ppppppp" is signing on. The user's reply is shown in lower case print. The Enter key (ENTER) on the keyboard is pressed after each response.

```
CONNECTED (this may vary by modem)
logon(ENTER)
INITIALS? iii(ENTER)
ACCOUNT? aaaa(ENTER)
ENTER RACF PASSWORD FOR RACFID III
PASSWORD? ppppppp(ENTER)
(some informational messages may be displayed)
READY
```

TSO's READY prompt indicates that TSO is ready to receive a command. For more information on using TSO, see the *NIH TSO Terminal User's Guide*.

For information on high-speed dialup access, see Section 7.3.1.

8.2.2.2 TSO/WYLBUR

> The date for the complete retirement of WYLBUR has not yet been determined. A version of WYLBUR will eventually be placed on the OS/390 (MVS) "standard system" (called Titan). CIT encourages users to consider alternative long-term strategies through the WYLBUR Transition Working Group. Refer to *Interface* for information related to WYLBUR.
>
> To keep informed about WYLBUR retirement issues and to join the RETIRE-WYL listserv list go to:
>
> http://silk.nih.gov/silk/retirewyl

WYLBUR is available as a command processor under TSO. Users can edit data sets with WYLBUR and process them with TSO programs without leaving TSO/WYLBUR. Also TSO CLISTs can contain WYLBUR commands.

8.2.2.3 ISPF

ISPF (Interactive System Productivity Facility) includes a set of utilities for editing, browsing and controlling data that can be used on their own or to develop an application. ISPF features a full-screen editor, four-way scrolling, sophisticated search and compare facilities, and online help. ISPF also includes interfaces to language processors that can be invoked in the foreground and extensive application testing facilities.

Interactive applications that run under control of ISPF are "dialogs" that prompt the user by displaying panels or screens from which the user may choose a function or enter data. The Dialog Manager (the application manager for ISPF) allows users to create applications using graphical user interfaces, including pop-up windows, action bars, and pull-down menus. Two additional products, MVS/QuickRef, a "pop-up" quick reference tool, and MAX, a collection of data and file manipulation programmer tools, provide enhancements to ISPF.

ISPF can be accessed directly from TSO or from the main DB2 menu. See 8.2.2.1 for TSO access information.

ISPF documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

8.2.2.4 MAX

MAX is a collection of data and file manipulation programmer tools for use under ISPF. MAX has the ability to browse and edit VSAM data sets as well as sequential data sets

online. MAX permits formatted browsing and editing using COBOL copybooks. In addition, MAX can be used to allocate or delete VSAM files. It eliminates ISPF's record length and file size restrictions. Other features include enhanced data set name lists, and a "cut and paste" option for records within one edit session or between edit sessions. MAX receives Level 2 support.

Instructions for accessing and using MAX are at:

http://silk.nih.gov/silk/max

Use the CIT publication ordering facility to place an order.

8.3 DATABASE SYSTEMS

This section describes the database systems supported at the NIH Computer Center. For more information on relational database facilities supported at the Computer Center, connect to:

http://silk.nih.gov/silk/datacenter/database.htm

The various forms of database assistance are described in Section 5.2.4.

8.3.1 IMS (Information Management System)

IMS (Information Management System) is a data base/data communication (DB/DC) facility that supports user-written batch processing and teleprocessing applications. Using the IMS facilities in a combination of batch and teleprocessing modes permits the efficient and orderly development of data management applications. IMS/VS user application programs may be written in Assembler Language, COBOL or PL/I.

IMS is a hierarchical database management system. It is appropriate for very large databases that will be accessed by many users at one time. A professional database administrator or programmer is required to set up the database's structure and keep track of implementation. Requesting a report with information formatted or selected in a new way requires extensive applications programming and cannot be done on short notice.

The database management facility of IMS is also referred to as Data Language/One or DL/I. The Batch Terminal Simulator (BTS II) is designed to operate as a batch program and provides a comprehensive development and debugging tool for IMS applications.

The NIH Administrative Database (ADB), which is used for functions such as purchasing (DELPRO), inventory, and travel, is maintained in IMS. ADB users must register with the Administrator of the Administrative Database so that the proper account can be billed for the IMS resources consumed and the appropriate IMS security can be assigned.

IMS can be accessed using QWS3270 PLUS (via NIHnet). For further information, see Section 7.2.2.2. Any problems in using IMS or interfacing with it should be directed to TASC.

Restricted Access
Currently the use of IMS/VS is restricted to projects approved by the Computer Center. This restriction is necessary because the NIH Computer Center's capacity to deliver the quantity and quality of support required by IMS/VS is limited. For more information, contact TASC.

IMS documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

8.3.2 Relational Database Systems

DB2 (IBM's DATABASE 2) and Oracle are relational database management systems (RDBMS) that are supported at the NIH Computer Center. They take advantage of the comprehensive backup and recovery facilities and excellent security offered by the NIH Computer Center's central servers. DB2 and Oracle house a variety of NIH enterprise-wide data including administrative, grants, personnel, and research data.

CIT offers two Oracle server environments:

- Oracle concurrent usage rights for local Oracle servers

  If you want to run your own Oracle server, you can purchase usage rights from CIT. See Section 8.6. For related charging and usage rights information, see Section 3.3.1.

- an Oracle Server on the Compaq/Digital AlphaServer 8400 (Enterprise Open Systems)

For more information on the Oracle environments, go to:

http://silk.nih.gov/silk/citoracle

The NIH Computer Center offers relational database systems to its users in an environment where users create and control their own database objects.

Overview
A relational database management system is one in which the data can be referenced in terms of its content, without regard to the way the data are actually stored. The database is perceived by users to be a collection of tables. Each piece of data can be referenced independently, without worrying about where it physically exists. Indexes provide efficient access to data in large tables. Multiple records can be inserted, updated and deleted at the same time, and many users can access and update data concurrently.

In a RDBMS, data is stored in the form of tables (relations) comprised of rows (records) and columns (fields). All access to and manipulation of data in a RDBMS is accomplished via Structured Query Language (SQL). SQL provides a relatively consistent and simple English-

like language for retrieving (selecting) and manipulating (inserting, updating, and deleting) data. Furthermore, SQL provides facilities for defining tables and controlling access to them. Users can create formatted reports containing information selected in many ways from the results of their queries.

Relational databases can be used to manage a wide variety of data, such as the results of research experiments, records of purchases for agency administrators, or the locations and serial numbers of pieces of equipment. A RDBMS is especially effective at handling data that need to be stored securely, data that need to be manipulated and analyzed interactively, and data that are the basis for one-time and recurring reports.

Web Access
Relational database management systems are powerful partners in the Web environment. Applications can be developed that access relational databases, with a Web browser as their front end. Common gateway interface (CGI) scripts can be developed on most Web server platforms (e.g., Windows and Unix).

The SILK (Secure Internet-LinKed) Web technology can be used to develop sophisticated, host-based, Web applications to relational database management systems and other OS/390 (MVS) data. See Section 8.5 for more information on SILK.

EZStart is a CIT tool that consolidates many useful DB2 functions in a single place, with an easy-to-use Web front-end. For more information, go to:

http://silk.nih.gov/dbtek/ezstart

Client/Server Access to RDBMS
Client/server access to the relational database environment on the central server (OS/390) and Enterprise Open Systems (Unix) is available through a variety of application development and end user oriented client tools that can function effectively on a multitude of clients running Windows and Unix operating systems. The combination of factors such as a powerful server, a high-speed network (NIHnet), and user-friendly client software can provide significant benefits for users.

TSO Access
At the NIH Computer Center, DB2 is accessible from a separate copy of TSO. Users in the relational database environment can enter TSO commands, or use ISPF within their sessions. This makes it convenient to examine job output, check on data set names, edit data sets or determine the status of a job during an online session.

Application Programming Facilities
Online and batch application programming facilities allow programmers to embed SQL statements in PL/I, COBOL, FORTRAN, C and Assembler programs, and have programs in those languages build and execute SQL statements. Client/server access allows an almost unlimited application development environment, including the C language and 4GL

environments. This capability allows users to create custom-tailored interfaces to a RDBMS for their applications and to perform sophisticated data validation as they are entered.

The RDBMS publications are listed in the CIT publication ordering facility.

The following are supported database-related software products:

Product	Function	Level of Support	Platform
BMC LoadPlus	Loads DB2 data economically	2	OS/390
DB2 Connect	Direct TCP/IP connectivity to DB2. See http://silk.nih.gob/dbtek/db2doc and select DB2 Connect Client/Server ODBC.	2	OS/390, client
IBM DB2 RDBMS	Relational database management system	1	OS/390
Neon Shadow Direct	ODBC for client/server connectivity to DB2	1	OS/390, client
Oracle SQL*Net	Client/server connectivity to Oracle	1	OS/390, client
Oracle SQL*Plus	3270-based facility for accessing remote Oracle servers (or DB2 via the Oracle Transparent Gateway)	1	OS/390
Oracle Transparent Gateway to DB2	Allows Oracle-specific SQL for access to DB2 via an Oracle database server	2	OS/390
QMF	Querying and reporting facility for DB2	1	OS/390

For additional information, please go to:

http://silk.nih.gov/dbtech

8.4 PROGRAMMING LANGUAGES

The NIH Computer Center supports a number of programming languages, offering through them a wide range of programming capabilities. Documentation for these languages can be reviewed and ordered through the CIT publication ordering facility. See Section 6.

8.4.1 Assembler Language

The IBM Operating System High Level Assembler is a symbolic programming language used to write programs for the IBM OS/390 (MVS) System. The language provides a convenient means for representing the machine instructions and related data necessary to program the IBM OS/390 (MVS) System. Assembler Language is generally used for system programming where machine-dependent operations are required that cannot be performed using one of the higher-level languages such as COBOL or FORTRAN. The Assembler program processes the language, provides auxiliary functions useful in the preparation and documentation of a program, and includes facilities for processing the Assembler macro language.

The NIH Computer Center supports High Level Assembler. The use of this language at the NIH Computer Center is described in the manual *Using Assembler Language at the NIH Computer Center*.

8.4.2 COBOL

COBOL (COmmon Business Oriented Language) is a programming language similar to English that is designed for data processing oriented programming applications. COBOL is used primarily for data manipulation, I/O, report generation, and basic mathematical functions. The COBOL compiler supported is COBOL/MVS. The use of this language at the NIH Computer Center is described in the manual *Using COBOL at the NIH Computer Center*.

8.4.3 FORTRAN

FORTRAN (FORmula TRANslation) is a programming language that is especially useful in writing programs for scientific, engineering, and biomedical applications that involve mathematical computations. The VS FORTRAN compiler is used at the NIH Computer Center. Most implementations of FORTRAN include all the features of the standard language plus some additional capabilities. The use of this language at the NIH Computer Center is described in the manual *Using FORTRAN at the NIH Computer Center*.

8.4.4 PL/I

PL/I (Programming Language One) is a multi-purpose programming language for use not only by commercial (business) and scientific programmers, but by real time programmers and systems programmers as well. PL/I contains substantially all of the capabilities of FORTRAN, COBOL, and ALGOL, with some additional features (i.e., list processing capabilities, bit and character string manipulation).

One of the primary considerations in the design of the language was modularity, that is, providing different levels of the language for different applications and different degrees of complexity. This means that programmers experienced in FORTRAN, ALGOL, or COBOL need not learn all of PL/I, but only a subset of it that closely resembles the language they have been using. The subset they learn will provide the programmers with the capability to operate with reasonable efficiency in PL/I.

The use of this language at the NIH Computer Center is described in the manual *Using PL/I at NIH*.

8.4.5 REXX/370

REXX/370 (Restructured EXtended eXecutor), which runs under TSO, provides a fully functional application development environment, including structured programming techniques, logical and arithmetic operations, and communication with the TSO end user. REXX/370 features a choice of compiled or interpretive execution, convenient built-in functions, free-format coding, debugging capabilities, and very extensive parsing and character string manipulation.

The Compiler and Library for REXX/370 provide a common user application interface so that REXX applications can be ported between OS/390 (MVS), OS/2, and VM/CMS systems. The REXX/370 Compiler and Library allow users to translate frequently used routines into compiled REXX programs. In addition, the REXX Library contains common routines that are accessible to all compiled REXX programs.

The REXX/370 documentation is available from the CIT publication ordering facility. See Section 6 for information on ordering publications.

8.5 SILK WEB TECHNOLOGIES

The SILK (**S**ecure **I**nternet-**L**in**K**ed) Web technologies allow users to set up, customize, and run their own Web servers without worrying about general maintenance issues. The NIH Computer Center handles all hardware/software purchases and upgrades, physical server security, connectivity, performance monitoring and tuning, and compatibility with the Web's emerging technology. SILK also permits data stored on the OS/390 (MVS) Enterprise System to be accessible through the World Wide Web. SILK technologies provide simple, yet powerful ways for users to develop and control their own Web pages, Web servers, secure intranets, and custom Web-based client/server applications. You can control access to the data by making it available to the general public or, by using RACF, restricting access to specific individuals or groups.

The data may be any type of output supported by Web browsers, including plain text, HTML, GIFs, JPEGS, or other binary files. The Web is now just another output option like printing or microfiche. For further information concerning SILK, visit:

http://silk.nih.gov

The Enterprise Open Systems (Unix) platform provides SILK Web facilities for easily building applications to obtain, examine, update, and store information using Web browsers. SILK technologies permit applications to be implemented on the platform that is most appropriate for their requirements.

8.5.1 SILK Web-Based Services

SILK Web technologies provide Web interfaces for large applications, enterprise databases and user services. SILK provides online services for enterprise computing through a Web interface. Many online services can be accessed using a Web browser. Refer to the SILK homepage and upcoming issues of *Interface* for future SILK Web applications developed for NIH Computer Center users. SILK-based online services are summarized in the following table.

Figure 8-1. SILK Servers for CIT Services

SILK-Based Service	Address
Customized Servers—Management	http://silk.nih.gov/msilk (See Section 8.5.2.)
Web Sponsor	http://silk.nih.gov/sponsor/homepage (See Section 12.5)
SILK Locator	http://silk.nih.gov/locator (See Section 12.10.1.)
Human Resources Information and Benefits System	http://silk.nih.gov/hribs/display
Database Technologies (DB2 and Oracle)	http://silk.nih.gov/dbtech
NBARS (NIH Backup And Recovery Service)	http://silk.nih.gov/silk/NBARS (See Section 13.7.)
Oracle Site License Information	http://silk.nih.gov/silk/oracle
National Center For Medical Rehabilitation Research	http://silk.nih.gov/silk/NCMRR
Web Listoff (Data Set Listing—for the OS/390 (MVS) System)	http://silk.nih.gov/listoff (See Section 12.11.)
Easymail (Sending e-mail through the Web)	http://silk.nih.gov/easymail (See Section 12.1.2.)
Web RACF (RACF Protection for Data Sets)	http://silk.nih.gov/racf (See Section 4.5.5)
Web Submit (Job Submission for the OS/390 (MVS) System)	http://silk.nih.gov/submit (See Section 12.6.2.)
Formsmail (e-mailing information from a Web form to a predetermined e-mail address)	http://silk.nih.gov/formsmail/doc (See Section 8.5.5)
WYLBUR Email Forwarding	http://silk.nih.gov/wylbur/reroute (See Section 12.1.2)

8.5.2 SILK Web Server Options

There are several SILK Web server options available: customized servers (set up and managed by the user), a public server (for all users), and a secure server (a public server with additional security options).

Customized Servers (http://silk.nih.gov/silk)
Customized SILK servers allow users to create and manage their own full-function SILK Web server without having to purchase and maintain hardware or software. The operating system for a customized SILK server is transparent to the user. A customized SILK server can be set up by anyone with a CIT account/initials combination, a Web browser, and an e-mail address. You can upload pages directly from your desktop computer using SILK's file transfer facility. OS/390 (MVS) System data sets can also be accessed through a customized SILK server. For information on linking OS/390 (MVS) data sets to pages on a customized SILK server, see Section 8.5.4.

SILK Web server owners can define and control access to their servers—providing the basis for a corporate intranet facility. There are three access security levels:

- "unrestricted" (for anyone with a Web browser)
- "registered users" (limited to CIT users)
- "designated users" (the owner designates the specific CIT userids that will have access privileges).

SILK server owners can also choose to apply an optional "group password" available to all three levels of access. In addition, secure socket layer (SSL) protection will soon be available to provide data encryption across the network.

To set up a customized SILK server, go to:

http://silk.nih.gov

and choose Customized Servers (under Applications). At the Customized Server page, select Create Server and enter a name for the server. When you set up a SILK Web server, you must comply with your agency's Web server policies. If you are associated with NIH, you will have an opportunity to read the NIH server policies. A server will not be created until indicate that you have read and understood your agency's policies.

Once you have created the server, you can make changes to it, such as adding a co-owner, changing the name or description of the server, changing the security level, adding the server to a registry of SILK servers, etc. Go to the Customized Server page, look in the Manage Server area, and click on the name of the server that you wish to change. To transfer files to your customized SILK server, go to the Customized Server Page, scroll down, and select the File Transfer Facility. You can also link OS/390 (MVS) data sets to your customized SILK server. For detailed information, see Section 8.5.4.

Public Server (http://silk.nih.gov/public/)
Data saved on OS/390 (MVS) disks can be immediately accessible on the Web by anyone with a browser. The SILK Web facilities allow any sequential file or PDS (partitioned data set) member to be displayed from a Web browser through the public server. The data to be displayed can be created and updated in the following ways:

- use an application on your desktop computer and upload the file to the OS/390 (MVS) System
- use TSO, ISPF, WYLBUR on the OS/390 (MVS) System
- submit a batch job on the OS/390 (MVS) System

The latest version of the data will be immediately available on the Web. When displayed from a browser, data can be printed or stored locally using the capabilities of the browser itself. See Section 8.5.3 for the data set format required for OS/390 (MVS) data sets displayed through SILK and for information on naming and accessing OS/390 (MVS) data sets for the public or secure SILK Web server.

With the SILK Web public server facility, users can view any of WYLBUR's "&PUBLIC" data sets from the Web. For example, the normal operating schedule of the NIH Computer Center is in the data set &PUBLIC.SCHEDULE. To view this through a Web browser, go to:

http://silk.nih.gov/public/public.schedule

Note: the name of the &PUBLIC data set appears after the last slash—without the ampersand (&).

Secure Server (http://silk.nih.gov/secure/)
The secure server has the capabilities of the public server, and also enables users to take advantage of the security features of the RACF facility. See Section 8.5.3 for the data set format required for OS/390 (MVS) data sets displayed through SILK and for information on naming and accessing OS/390 (MVS) data sets for the public or secure SILK Web server.

Anyone accessing the SILK secure server must provide a valid userid (i.e., valid CIT account and initials) and the password (RACF password). This userid will be checked for RACF authority to read the data set. The browser will cache the userid and password for the remainder of the time it is open.

It is the data set owner's responsibility to establish appropriate RACF protection. If no protection exists, anyone can access the data set via the public server.

RACF protection controls access to the data. Use the RACF facility to obtain generic protection for groups of files to be displayed. You can also define a group of users who can access your pages. See Section 4.5.13 for information on protecting OS/390 (MVS) data sets, via RACF, for secure SILK Web servers.

8.5.3 OS/390 (MVS) System Data Set Format

Text or HTML Files

If you are using a WYLBUR data set on a SILK Web server, specify the HTML option of the WYLBUR SAVE command. The HTML option allows users to save any text data in a format compatible with the SILK Web server. **The SILK Web server cannot process edit format data.** To save a data set in WYLBUR for the public or secure servers, enter

```
SAVE AS @WWW.name.type HTML
```

or

```
USE CLR FROM dsname
RESAVE AS @WWW.TEMP.TXT HTML ALWAYS
```

WYLBUR will save the data in a format suitable for display on the Web. The ALWAYS option saves the data set in case it does not yet exist.

If you are saving a WYLBUR data set for use on a customized server, there is no additional data set naming convention. However, the data set must be saved using the HTML format.

```
SAVE AS mydata HTML
```

Graphics Files

If you want to display a graphics file (e.g., a GIF or JPEG file); upload the file from your PC, via FTP, using binary format. Specify RECFM VB and LRECL 255 on the OS/390 (MVS) system. Make sure the file conforms to the naming requirement described above. Specify an extension of GIF for a GIF file, and JPEG or JPG for JPEG files.

Naming Data Sets for the Public and Secure Servers

To display OS/390 (MVS) System data on the World Wide Web using the public or secure SILK Web servers, save the data set using the naming syntax

```
aaaaiii.@www.name.type
```

- "aaaaiii"- the account/initials combination (aaaaiii is implied when you save data in TSO or WYLBUR).
- "@www"- required after the "." following the account/initials combination. If you try to access a data set with a name that does not have "@www" as the second qualifier, you will receive an error message.
- "type"- one of the standard "content" types (e.g., HTML, GIF, TEXT) recognized by most browsers. If the data set name does not end with a valid content type, TEXT is assumed. The allowable qualifiers for file type include:
  - .html - for a data set that is an HTML file (text with hypertext mark-up language coding included to improve the appearance of the display on the Web)
  - .text or .txt- for a data set that is plain text

- .gif - for a data set that is a GIF (graphics) binary file
- .jpeg - for a data set that is a JPEG (graphics) binary file
- .dsncc - for a data set that is a text file with carriage control (codes for carriage control will be converted to HTML for viewing with a browser)

  Many batch jobs create output with the first column position representing printer carriage control. The carriage control codes are converted as follows:

In first column	***Means (to OS/390 system)***	***Becomes (in HTML)***	
1	skip to head of form(i.e., next page)	<hr>	horizontal rule
[blank]	single spacing		[ ]
0	double spacing	 	break
-	triple spacing	 *	break break*

  * *Please note*: some browsers treat

 as a single <br>.

For example: the data set aaaaiii.@www.silk.test.html can be viewed by opening a Web browser to:

http://silk.nih.gov/public/aaaaiii.@www.silk.test.html

8.5.4 Linking OS/390 (MVS) Data Sets to Pages on a Customized SILK Server

SILK Web's customized servers allow users to associate OS/390 (MVS) data sets with Web pages (URLs) on a customized SILK server. Owners of SILK customized servers can go to:

http://silk.nih.gov/msilk

to see a list of all their SILK customized servers. To associate a page on the server with an OS/390 (MVS) data set, do the following:

- click on a server name
- choose the option "Add a page using an existing MVS file"
- type the name for the page on your SILK server and click the "Add" button
- on the form that is displayed, type the OS/390 (MVS) data set name to be associated with the Web page
- select the appropriate document type for the Web page from the drop-down list box

Document type	Description
"text/html"	for data sets containing html tags
"text/plain"	for data sets containing text only
"dataset/cc"	for data sets containing text with a carriage control (cc) character in column 1
"suffix"	for data sets that have a document type as the last qualifier in the data set. With the "suffix option" the Web page name aaaaiii.mypage.html is interpreted as "text/html" whereas aaaaiii.myimage.gif would be interpreted as "image/gif."

- select the "Create" button

Example:

> If you have a server called "Personnel," you can create a Web page for that server called "Leave." Associate the OS/390 (MVS) data set aaaaiii.hr.leave (where aaaa is your registered CIT account and iii your initials) by following the instructions above. Each time a browser requests http://silk.nih.gov/silk/personnel/leave, the contents of OS/390 (MVS) data set aaaaiii.hr.leave will be displayed.

(The initial part of Web addresses—http://silk.nih.gov/silk/personnel/—is not included in the following examples.)

Additional Information for Partitioned Data Sets
SILK allows users to link a Web page to a member of a partitioned data set (PDS).

Example:

> You can create a Web page called "policies/overtime" and associate it with a member of the OS/390 (MVS) partitioned data set "aaaaiii.hr.policy(ot)."Note that the Web page name can contain "/" to indicate subdirectory.

Wildcards in Web Addresses
SILK permits Web page addresses containing wildcards. Wildcard pages use "*" to indicate a value that will be determined by the URL requested. A portion of the page name determines the OS/390 (MVS) data set name to be displayed. With wildcard Web pages, you do not have to manually associate each Web page with a specific data set.

Examples:

A Web page called "Vacancies/*" can be associated with the OS/390 (MVS) data set "aaaaiii.vac.*". When the full Web address is typed into the browser window by the user, the portion corresponding to the "*" will be substituted into the "*" in the OS/390 (MVS) data set name. If the incoming Web address is vacancies/tech/cs001, then the OS/390 (MVS) data set "aaaaiii.vac.tech.cs001" is displayed. Note: a "/" in the Web address is automatically converted to a "." in the data set name.

The Web page name called "Training/*" can be associated with a member of an OS/390 (MVS) partitioned data set "aaaaiii.train.course(*)."Whenever the Web address training/crs1234 is requested, the corresponding OS/390 (MVS) data set "aaaaiii.train.course(crs1234)" would be displayed.

The NIH Computer Center strongly recommends the use of RACF profiles to protect the OS/390 (MVS) data set that you display on the Web from unwanted access. See Section 4.5.13 for further information.

8.5.5 Formsmail

Formsmail is a SILK facility that sends information collected using an online Web form directly to a specific, predetermined e-mail address. With Formsmail, a registered user can set up a form on any Web server (including SILK Web customized servers) and receive the resulting information via e-mail.

To use Formsmail:

- Create the HTML form to collect the necessary information. Specify

  ACTION=http://silk.nih.gov/Webmail/formsmail

  in the <form...> tag

- Include a "hidden" input field with a name of "to" and a value that specifies the e-mail address to receive the values specified by the submitter. For example:

  <INPUT TYPE=hidden NAME=to VALUE="my.name@nih.gov">

- The specified e-mail address will receive e-mail containing the name of each input field, drop-down list box, radio button, etc., and the value specified by the submitter. The information e-mailed is also displayed to the submitter unless the "msg" hidden field (see below) is specified.

- The following optional hidden fields may also be used:

  <INPUT TYPE=hidden NAME=cc VALUE=" e-mail address">
  an address to receive a courtesy copy of the e-mail

  <INPUT TYPE=hidden NAME=subj VALUE=" e-mail subject">
  text to be contained in the "Subject:" field of the e-mail

  <INPUT TYPE=hidden NAME=msg VALUE="user message">
  a message to be displayed to the user instead of the form contents

  For example, with the following line of code, the submitter of the form will receive a screen message that says "Thank you."
  <INPUT TYPE=hidden NAME=msg VALUE="<h2>Thank you.</h2>">

- The submitter of the information will be prompted for a user name (account/initials) and password. e-mail transmitted from the submitted form will contain the specified initials in the "From:" field of the e-mail.

- The form can reside on any Web server—including a SILK customized server—or as an "@WWW." data set. For more information on SILK facilities, go to:

  http://silk.nih.gov

Public Forms
If you wish to create a form that can be submitted by someone who does not have a registered account/initials combination, a "public" form can be set up. Submitters will not be required to specify a CIT user name and password. However, the owner of the form must specify an account/initials combination under which the mail can be submitted. To request setup for a public form, go to the SILK Web page and send e-mail to silkweb@list.nih.gov.

8.6 ORACLE SERVER SOFTWARE FOR OTHER PLATFORMS

CIT has an Oracle licensing agreement that includes Oracle server software, a concurrent user network license, related maintenance, and technical support. NIH users and organizations who want to run their own Oracle server on one of the platforms covered by the site license can purchase the server software and concurrent user licenses directly from CIT at favorable prices. See Section 3.3.1 for specific charging information.

To obtain any of these products from CIT, go to:

http://silk.nih.gov/silk/citoracle

This site contains details about what is included in the license, cost information, the memorandum of understanding (MOU) describing the license agreement, and the order form.

The NIH Computer Center also provides Oracle on the Compaq/Digital AlphaServer 8400 (Section 8.1.2.1). For more information, refer to the Web site or contact TASC.

8.7 FILE INFORMATION SYSTEMS

VISION:Builder and VISION:Report are file information systems that run on the OS/390 (MVS) South System. They receive limited support at CIT.

VISION:Builder is a high level, non-procedural, 4GL system and batch application development tool enabling the development of large-scale batch processing applications requiring access to single or multiple heterogeneous databases.

VISION:Report is a program development and report writing tool utilizing a free-format, COBOL like language. It allows users to build and execute programs, minimizing the amount of programming time and effort to fix a file, prepare a report, or generate test data.

Contact TASC for further information regarding these products.

9 PRINTING AND GRAPHICS SERVICES

This section describes the facilities provided for printed output produced at the central facility. A summary of the job control language statements used by batch jobs to select output options can be found in the manual *Batch Processing and Utilities at the NIH Computer Center*. Printing services are available through batch jobs, WYLBUR's LIST command, network connections (see Section 11.6) or through the World Wide Web using the SILK Web Listoff facility (see Section 12.11).

Changes that affect the printing services offered by the NIH Computer Center will be fully tested and pre-announced through *Interface*, the technical newsletter published for users of the NIH Computer Center. Refer to the WYLBUR documentation for additional information on printing services for the OS/390 (MVS) System. Use the CIT publication ordering facility to place an order.

9.1 STANDARD PRINTING SERVICE

The standard printing service is the set of default printing attributes for users' printed output. The printing is done on a continuous form laser printer that produces high quality printing at approximately 229 pages per minute on continuous forms. Because there are always printers set up to produce "standard" format output, the standard printing service allows fast turnaround for printing of up to 150,000 lines. See Section 10.5.1 for information on job turnaround times.

The standard printing service output uses STD paper (described in Section 9.9.1) and the SN12 character set at 8 lines per inch.

The laser printer produces high quality output. A laser light beam forms the characters by activating a portion of the paper which then attracts ink particles which are sealed on the paper by a heated drum. The shape of the character is under software control.

9.2 OTHER LASER PRINTING

In addition to the standard printing service described above, there are a wide variety of forms and characters sets available on the laser printers. The cut-sheet printer offers double-sided (duplex) printing and many other options. While the standard printing service meets many users' printing needs, the additional capabilities of the laser printers make it possible to tailor printed output formats to meet the needs of specific applications.

Although the laser printers produce high quality output, they cannot be used to do the following: printing on pressure sensitive labels; overprinting with any character except the underline; or printing within 1/2 inch of the top or bottom of a page. It should be noted that longer listings, those requesting any form other than the laser standard (STD) form, graphics printing that uses all points addressable (APA) mode printing, or the impact printer are guaranteed 24-hour service, though these jobs may frequently be completed sooner.

9.2.1 Continuous Form Printing

The standard laser printers produce high quality single-sided output on continuous forms. For the types of forms available, see Section 9.9. There are over 40 different character fonts (see Section 9.11). Up to 2 fonts can used in any document printed on the continuous form laser printer. In APA (all points addressable) page mode, these laser printers can print plots generated via SAS/GRAPH. These plots can have a resolution of 240 x 240 pixels per inch and are printed on the STD form. For information on the graphics packages used to generate these plots, see Section 9.15.

Additional features of the continuous form printers include:

- online forms generation
- compatibility with PC-based software
- PostScript compatibility
- shrink wrapped output

9.2.2 Cut-sheet Printing

The cut-sheet laser printers produce high quality single-sided or double-sided (duplex) output on single forms. A variety of forms are available; see Section 9.9. All of the character fonts described in Section 9.11 are available on the cut-sheet printer. Up to 4 fonts can be used in any document printed on the printer. To request printing on the cut-sheet printer in batch jobs, use the OUTPUT statement. (Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.) WYLBUR users can request cut-sheet printing by specifying a cut-sheet form in the LIST command (e.g., LIST FORMS=999P). The DUPLEX option of WYLBUR's LIST command requests two-sided printing on the cut-sheet printer. In APA (all points addressable) page mode, the cut-sheet laser printers produce particularly attractive output of plots generated via SAS/GRAPH. These plots can have a resolution of 240 x 240 pixels per inch and are printed on the 900L form. For information on the graphics packages used to generate these plots, see Section 9.15.

9.2.3 PostScript Printing

PostScript files can be printed on the cut-sheet printers using the POSTSCRP procedure. The PostScript file must be transferred to the OS/390 (MVS) System in binary format and have a logical record length (LRECL) less than or equal to 256. If no printing options are specified, single-sided, 8 1/2- by 11-inch copy will be produced. PostScript printing on the central printers receives Level 2 support (see Section 5.1).

PostScript files can be uploaded to the OS/390 (MVS) System for printing using any method that permits binary transfer (e.g., via Kermit or FTP). Binary transfer is necessary because the mainframe PostScript driver requires that the input be in ASCII. The file must also be uploaded with an LRECL of 256 or less.

PostScript can be generated by many different word processing and desktop publishing software products on multiple platforms. Software on some platforms, however, produces PostScript files that do not conform 100% to PostScript standards. Consequently, it is not uncommon to find that PostScript files produced on one platform will not print on PostScript-compatible printers on another platform. Although the IBM PostScript printing facility works for the vast majority of uploaded PostScript files, it is not guaranteed to work for every PostScript file. Therefore users should run extensive tests before developing any large-scale application using PostScript printing.

9.3 IMPACT PRINTING

The slower impact printers are available for printing jobs that cannot be handled by the continuous form laser printers. A job requiring use of the impact printer may require up to 24 hours to be printed. Only the SN10 character set is available on the impact printers.

An impact printer is required if:

- Printing must extend across page boundaries.
- Overprinting with a character other than an underline must be done.
- Printing is done on pressure sensitive labels or multi-part forms.

9.4 MICROFICHE OUTPUT

The NIH Computer Center offers offline microform output on 105mm microfiche. The data to be produced on microfiche is written to a tape. The tape is mounted on the COM (Computer Output Microfilm) unit and the data is written by a light beam onto a spool of photosensitive film. The film is then developed to produce the originals. Inexpensive duplicates can be produced if they are desired. The guaranteed turnaround for microform jobs is 24 hours. For additional information, see Section 10.7

9.5 RJE WORKSTATION FACILITIES

Remote Job Entry Workstations are located at users' sites and communicate with the NIH Computer Center mainframes over telephone lines. Job output as well as individual SYSOUT data sets can be directed to a remote workstation. Because the remote workstations are obtained by individual organizations, they vary in their facilities, services, and regulations. (For example, different types of paper are offered by some remotes and not by others.)

For more information on remote workstations, see Section 14.4.

9.6 VTAM PRINTERS

VTAM printers are (usually low-speed) printers that are part of the SNA network and are located at users' sites. They are connected to controllers that communicate with the central

facility via dedicated or switched lines. They can be defined as RJE printers and output routed to them using their VTAM node name. See Section 14.4.

9.7 NETWORK PRINTING SERVICES

Users can print output from the OS/390 (MVS) system to a local networked printer using the VTAM Printer Support System (VPS). Printed output from Delpro and other ADB services, DB2, WYLBUR, and batch jobs can be produced on printers attached to a PC, workstation, or local area network (LAN) connected to NIHnet and running an LPD server. AppleTalk printers are also supported in conjunction with the PrintShare services provided by CIT.

Workstations connected to NIHnet or the Internet can transmit files via TCP/IP for printing on the OS/390 (MVS) System's mainframe printers. Two techniques can be used: LPR and SITE SUBMIT.

Refer to Section 11.6 for more information on printing over the network.

9.8 PRINTING FROM THE HELIX SYSTEMS

Users of the NIH Helix Systems can send output to the NIH Computer Center central printers using the helix print370 command. For full information on the printing options, helix users should type

```
man print370
```

at the Helix prompt (helix%).

9.9 COMPUTER CENTER FORMS AND LABELS FOR PRINTING

The tables in this section show the types of paper available on the laser and impact printers and the kinds of labels that can be used on the impact printers. NIH users who need paper for use at remote printers can order through the NIH stock catalog or purchase it through the NIH self-service stores.

9.9.1 Forms for Laser Printing

A variety of NIH supplied forms are available for use on the laser printers. Forms are requested through their form designations that are given in the following table. Laser standard paper (STD) is the default form for jobs printed on the continuous form laser printer. The default density for forms STD, 900L, and 999L is 8 lines per vertical inch, and the default character set is the SN12. SN10 is the default character set for all other laser printing forms, and the default density is 6 lines per inch. For the forms on the cut-sheet printer (900P, 900L, 999P, and 999L), the "P" stands for portrait ("tall") mode, and the "L" stands for landscape ("wide") mode.

Figure 9-1. Forms for Laser Printing

Form Number	Width x Length In Inches	Maximum Characters per Line at various pitches				Comments
		10	12	13.3	15	
STD	11 x 8 1/2*	110	132	N/A	165	continuous form printer
900P	8 1/2 x 11	83	100	110	124	cut-sheet, single- or double-sided
900L	8 1/2 x 11	108	129	142	161	cut-sheet, single- or double-sided
999P	8 1/2 x 11	78	94	103	117	cut-sheet, 3-hole punched single- or double-sided
999L	8 1/2 x 11	108	129	142	161	cut-sheet, 3-hole punched single- or double-sided**
LH1	8 1/2 x 11*	84	101	N/A	126	NIH letterhead, cut-sheet, see carriage control note

Notes:
*Size is given with easy-strip margins removed.
**In duplex mode, use of PAGE=59 (WYLBUR's LIST command) or LINECT=59 (OUTPUT JCL statement) on form 999L in duplex mode is suggested to avoid having some characters on the back of the page cut by the holes.
Carriage control: LH1 requires use of ASA carriage control. A "2" is used to skip past the heading.

9.9.2 Forms for Impact Printing

The laser-standard paper, available through the standard printing service, cannot be used on impact printers. The impact printers must be used for Computer Center-supplied labels and user-supplied forms. Computer Center labels are pre-gummed and are attached to sheets of waxed paper that contain the necessary pin-feed holes. The labels are arranged one across on the sheets. Samples are available at Output Distribution Services.

Data to be printed on labels by batch jobs must have valid carriage control characters in column 1 of each line. The carriage control characters to be used are shown in the table below. Each label name follows the pattern: lwdn where:

"l" stands for labels.
"w" is the width in truncated inches. (e.g., 2 is used for 2 3/4 inch wide labels)
"d" is the depth.
S for 7/16 inch (small)
M for 15/16 inch (medium)
L for 1 7/16 inches (large)
"n" is the number of labels across the page.

Figure 9-2. Labels for Impact Printing

Form Name	Label Size x Length	Number Across	Chars. Per Line per Label	Beginning Column for each Label*	Lines per Label*		Normal Carriage Control	Control Charac-ter for Print Line 1
					6 lpi	8 lpi		
L2S1	2 3/4 x 7/16	1	26	2	2	3	1, 2, 3	1, 2, 3
L2M1	2 3/4 x 15/16	1	26	2	5	7	1, 2	4, 5
L2L1	2 3/4 x 1 7/16	1	26	2	8	11	1	4
L3S1	3 1/2 x 7/16	1	34	2	2	3	1, 2, 3	1, 2, 3
L3M1	3 1/2 x 15/16	1	34	2	5	7	1, 2	4, 5
L3L1	3 1/2 x 1 7/16	1	34	2	8	11	1	4
L4S1	4 x 7/16	1	38	2	2	3	1, 2, 3	1, 2, 3
L4M1	4 x 15/16	1	38	2	5	7	1, 2	4, 5
L4L1	4 x 1 7/16	1	38	2	8	11	1	4
L5S1	5 x 7/16	1	49	2	2	3	1, 2, 3	1, 2, 3
L5M1	5 x 15/16	1	49	2	5	7	1, 2	4, 5
L5L1	5 x 1 7/16	1	49	2	8	11	1	4

Notes:
***** When the carriage control characters listed in the "Normal Carriage Control" column are used, printing starts on line 2 of each label. To get the maximum number of lines per label at a given density of lines per inch (lpi), use the Carriage Control Characters for print line 1 given in the right-most column of the table. Small labels always use print line 1.

****** Column one is occupied by carriage control.

9.10 USER-SUPPLIED FORMS

The NIH Computer Center provides for printing on custom-designed user forms. Such forms include pre-printed invoices, multi-ply forms, and card stock. All must be fan-folded with pin-feed margins.

9.10.1 Registering and Supplying Forms

Each user-supplied form must be registered with Output Distribution Services before it is used for the first time. Jobs that request a non-registered form will fail with an error message. A specific form needs to be registered only once. If the form changes significantly (e.g., size, pre-printed material, number of parts), it should be re-registered. Once registered, a supply of the form must be delivered to Output Distribution Services each time it is used. Only a small supply can be maintained because of space limitations and fire regulations.

Output Distribution Services requires the following information when a form is registered:

width	in inches (includes perforated margins and backing for labels)
usable width	how much of the width may be used for printing
length	in inches (a page or sheet of labels)
parts	number of plys
FCB	the name of the Forms Control Buffer (FCB) that will be used for the form when none is specified. Several FCBs are provided by the NIH Computer Center and one of these, or a user-supplied FCB, may be specified as the default. See Section 9.12 for information on Computer Center-supplied FCBs and registering user FCBs.
character set	the name of the character set to be used with the form if none is specified. See Section 9.11 for information on character sets.
alignment data set	the name (and disk volume) of a data set which can be used to verify form alignment. This data set should contain valid carriage control characters and should be stored in WYLBUR's edit format.
sample page	a sample listing of the alignment data set printed with proper alignment should be supplied. To make this easier, the form may be pre-registered by contacting Output Distribution Services.
laser eligibility	whether the form is eligible for use on the continuous form laser printers. See Section 9.10.2 for the special requirements for laser printing.

person responsible	name, address, and telephone number of the individual responsible for the form

At the conclusion of the registration process, the person who registered the form will be given a four-character form name of the form Fnnn. This name is used whenever the form is requested through WYLBUR or on a /*DDOUT or /*JOBOUT statement.

9.10.2 Special Requirements for Laser Printers

In order to be eligible for continuous form printer use, a form must meet certain physical and usage requirements. These requirements are as follows:

- The form must be one of the following discrete widths (in inches)

  6 1/2, 8 1/2, 9 1/2, 9 7/8, 10 5/8, 11, 12, 13, 14 3/10, 14 7/8

- The form must be one of the following discrete lengths (in inches):

  3 1/2, 5 1/2, 7, 8 1/2, 11

- The form must be only one part (ply).
- The form cannot be a pressure-sensitive label.

Numerous other paper quality requirements must be met for a form to be usable on the continuous form laser printers. The items mentioned above reflect only the basic physical necessities. If a form meets these requirements, contact the CIT Technical Assistance and Support Center (TASC) to determine whether it can be used on the continuous form printers.

The printing speed of the continuous form printers is somewhat offset by the time required for loading and aligning forms. Because of this initial setup time, low-usage forms should not be designated as eligible for these printers. A minimum use of about 50,000 lines of output per day (on those days that the form is used) is mandatory.

9.11 CHARACTER SETS AND PRINT TRAINS

Only the SN10 10-pitch print train can be used on the impact printer. A variety of font sizes (10, 12, 13.3, 15, and tri-pitch) are available on the laser printers. The name of each character set is of the form "ttnn" where "tt" indicates the characters available and "nn" indicates the pitch or number of characters printed per inch (for example, SN10, PI12, GT15, and EBTR). Tri-pitch (TR) fonts have characters with three different widths; for example, the "w" is wider than the "i."

The character sets available for the laser printers are:

BITR, BRTR, CE10, CE12, CI15, CN10, CO10, CR10, DOTR, D225, D226, D227, EBTR, EITR, ESTR, GB10, GB12, GI12, GR10, GT10, GT12, GT15, LB12, LR12, OA10, OB10, OR10, PB12, PI12, PR10, PR12, RT10, SB12, SE10, SE12, SI10, SI12, SN10, SN12, SN15, SO12, SR12, ST10, ST12, ST15, SY10, SY12, TN10

The following character sets are available on the cut-sheet laser printers only:

D225, D226, D227, CI15

A special 10-pitch font (OA10) is designed to be scanned by an optical character reader.

Character Sets for Laser Printing
A wide variety of character sets (fonts) are available for output on the laser printers. Up to 4 fonts can be used in any document printed on the cut-sheet laser printer; only 2 fonts may be used in a document printed on the continuous form laser printer. To view the character sets go to:

http://datacenter.cit.nih.gov/print-ug

Hexadecimal Tables for Character Sets and Print Trains
To view tables showing the hexadecimal character representations for all available characters in each font (character set) and keyboard diagrams go to the Web address above and click on "Hexadecimal Tables."

9.12 CARRIAGE CONTROL

Vertical spacing is defined for a page of printed output by a Forms Control Buffer (FCB). A default FCB is associated with each form used for printed output; the defaults for Computer Center-supplied forms are established by the Center. A default FCB for each user-supplied form is established by the user when the form is registered.

A data set can be printed using either machine carriage control or ASA carriage control. Machine carriage control uses unprintable hexadecimal characters in column 1 of each record of the data set to control vertical spacing. As its name implies, machine carriage control is the carriage control that printers actually use to control vertical spacing when printing on a form. ASA carriage control uses printable characters in column 1 of each record of the data set to control vertical spacing; the ASA carriage control characters are translated into machine carriage control by the JES2 component of the operating system before the output is printed.

A record format (RECFM) ending in A indicates that the data set has ASA carriage control; one ending in M indicates machine carriage control. If an invalid character appears in the carriage control column, the results are unpredictable. If a data set does not contain carriage

control, the RECFM should not include A or M (e.g., RECFM=FB), and column one of each record of the data set will treated as text.

When carriage control characters (either ASA or machine) are used for controlling output spacing, two types of positioning can be used: line-oriented and channel-oriented. Line-oriented positioning specifies the number of lines to "move the carriage" before or after the line is printed. The line-oriented carriage control characters are defined by the system, and are NOT specified within the FCB.

In channel-oriented positioning, the FCB relates channel codes (1-9, A-C) to specific lines on a form. Channel-oriented carriage control characters initiate a vertical "skip" down the lines of a page. To terminate the skip, a channel code corresponding to the carriage control character must be coded in the FCB. This channel code marks the line on the form where the skip will terminate. For example, if the FCB defines channel 8 to relate to line 55 on a form, and a carriage control character of 8 is encountered in the output, the form will automatically advance to line 55 before printing resumes. As another example, if the FCB defines channel 11 ("B") to be associated with lines 14 and 45 on a form, and a carriage control character of B is encountered in the output, the form will automatically advance to either line 14 or 45, whichever is encountered first.

The JES2 component of the operating system requires that Channel 1 be defined in all FCBs. JES2 "skips to Channel 1" prior to printing the Header and Trailer pages on the output. For output other than labels, Channel 1 is always print line 4 for 6 lines-per-inch density, line 5 for 8 lpi, and line 6 for 10 lpi. Other channels may be set at vertical positions above Channel 1 for impact printing, but may not be set above Channel 1 in FCBs intended for the laser printers. For labels, Channel 1 should be defined near the top of the label and Channel 10 should be defined as the last print line before the perforation on a page of labels.

Line-Oriented Carriage Control Characters

ASA CODE (EBCDIC)	ACTION BEFORE WRITING PRINT LINE
blank	Advance one line
0	Advance 2 lines
-	Advance 3 lines
+	Do not advance

MACHINE CODE (HEX)	PRINTER ACTION
01	Print, then do not advance
09	Print, then advance 1 line
11	Print, then advance 2 lines
19	Print, then advance 3 lines
0B	Advance 1 line, do not print
13	Advance 2 lines, do not print
1B	Advance 3 lines, do not print
03	No operation

Channel Oriented Carriage Control Characters

ASA CODE (EBCDIC)	ACTION BEFORE WRITING PRINT LINE
1	Skip to Channel 1
2	Skip to Channel 2
3	Skip to Channel 3
4	Skip to Channel 4
5	Skip to Channel 5
6	Skip to Channel 6
7	Skip to Channel 7
8	Skip to Channel 8
9	Skip to Channel 9
A	Skip to Channel 10
B	Skip to Channel 11
C	Skip to Channel 12

MACHINE CODE (HEX)	PRINTER ACTION
89	Print, then skip to Channel 1
91	Print, then skip to Channel 2
99	Print, then skip to Channel 3
A1	Print, then skip to Channel 4
A9	Print, then skip to Channel 5
B1	Print, then skip to Channel 6
B9	Print, then skip to Channel 7
C1	Print, then skip to Channel 8
C9	Print, then skip to Channel 9
D1	Print, then skip to Channel 10
D9	Print, then skip to Channel 11
E1	Print, then skip to Channel 12
8B	Do not print, skip to Channel 1
93	Do not print, skip to Channel 2
9B	Do not print, skip to Channel 3
A3	Do not print, skip to Channel 4
AB	Do not print, skip to Channel 5
B3	Do not print, skip to Channel 6
BB	Do not print, skip to Channel 7
C3	Do not print, skip to Channel 8
CB	Do not print, skip to Channel 9
D3	Do not print, skip to Channel 10
DB	Do not print, skip to Channel 11
E3	Do not print, skip to Channel 12

9.12.1 Computer Center Forms Control Buffers (FCBs)

The following FCBs are provided by the NIH Computer Center:

FCB Name	Form Length (in inches)	Lines per inch
806	8 1/2	6
808	8 1/2	8
810	8 1/2	10
1106	11	6
1108	11	8
1110	11	10

These FCBs may be used with any registered form which is of the correct length. Thus, for an 11 inch form, 1106, 1108, or 1110 is valid. Each of these FCBs has the following carriage control characters defined:

Carriage Control Character	Action
1	Skip to the "top" of the next page.
2	Skip to the next half (middle or bottom) of the page
3	Skip to the next third (one-third or two-thirds) of the page.
9	Skip to the next-to-the-last-line of the page

9.12.2 Registering User Forms Control Buffers

Users can register FCBs that differ from those provided by the NIH Computer Center. Output Distribution Services should be contacted to perform the FCB registration. To complete this registration, the following information must be provided:

form length	the length of the form, specified in inches
vertical density	the number of lines per inch that will be used for the FCB. The values available are 6, 8, and 10 lines per inch. Please note that a separate FCB must be registered for each density that will be used with a given form. The DENSITY parameter on the /*DDOUT statement should not be used with user FCBs since it produces unpredictable results.
channel codes	the channels to be defined and the line numbers that are to be associated with them. Channel 1 must be defined as print line 5.
person responsible	name, address, and telephone number of the individual responsible for the FCB

At the conclusion of the registration process, the person who is responsible for the FCB will be given a four-character FCB name. This FCB name will be specified (i.e., in /*JOBOUT and /*DDOUT statements and WYLBUR LIST commands) when the FCB is to be used. The FCB can also be designated as the default for a user-supplied form, in which case it need not be specified when that form is requested. The default designation is specified at the time the form is registered. See Section 9.10.1 for specific details.

9.13 OTHER JOB OUTPUT OPTIONS

Options to specify multiple copies, density (in lines per inch), the number of lines per page, and table reference characters are described in this section. See Section 9.14.1 for the default values for printing options.

9.13.1 Copies

Multiple copies may be requested for the entire output of a job or for individual SYSOUT data sets. The maximum number of copies that can be specified is 250.

9.13.2 Density

Output may be printed with a vertical density of 6, 8, or 10 lines-per-inch (lpi). The 10 lpi density is available only on the laser printers. A density of 8 lpi is the default when laser standard paper is used; 6 is the default for all other forms. Because many 12-pitch laser fonts are designed for printing only at 6 lpi, DENSITY=6 should be specified when they are used on standard forms. If a font is printed on a laser printer at a higher density than it is designed for, the tops of the characters will be missing. The appropriate densities for each laser font are provided along with font examples at:

http://datacenter.cit.nih.gov/print-ug

The DENSITY option cannot be used in combination with a user FCB; see Section 9.12.2.

9.13.3 Page Size

Page size determines the number of lines to be printed on a page before skipping (ejecting) automatically to the top of the next page. The number of lines that can be printed on a page depends on the density in vertical lines-per-inch (lpi), the length of the form, and the printer being used. Carriage control, described in Section 9.12, permits the user to enter ejects at selected places in the text.

Laser Printer Page Limits

The continuous form laser printer cannot print on the top or bottom 1/2 inch of a page. Laser standard paper is only 8 1/2 inches long so only 7 1/2 inches can be printed per page. On standard forms, which are 11 inches long, 10 inches can be printed.

Figure 9-3. Maximum printable lines per page

Forms	10 lpi	8 lpi	6 lpi
Laser standard paper, 900L, and 999L	75	60*	45
Other forms	100	80	60

*When specifying form 999L in duplex mode, use PAGE=59 (WYLBUR's LIST command) or LINECT=59 (OUTPUT JCL statement) to avoid cutting some characters on the back of the page by the holes.

Any paging request for more than these maximums causes the output to be printed on an impact printer.

Impact Printer Paging

The impact printers can print across page boundaries. A maximum page size of 255 lines may be specified, though this much text will actually be printed on more than one page. Automatic page ejects can be suppressed entirely. When this is done, page ejects are effected through carriage control, or the text can be printed continuously without ejects.

9.13.4 FORMDEF for Cut-sheet Printing

When using the OUTPUT JCL statement to request printing on the cut-sheet printer, a form definition (FORMDEF) must be specified to indicate whether single-sided or double-sided printing is being used.

Figure 9-4. FORMDEFs for the cut-sheet printer

Form Number	FORMDEF	
	single-sided	**duplex**
900P	PS00	PD00
900L	LS00	LD00
999P	PS99	PD99
999L	LS99	LD99

9.13.5 Table Reference Characters (TRC)

Four fonts (character sets) may be used in output printed on the cut-sheet laser printers; 2 may be used on the continuous form laser printers. Therefore, there must be a way to indicate which portions of the output are to be printed in each font. For batch job output, this is done with Table Reference Characters (TRCs) and the CHARS=parameter. The DCB subparameter OPTCD=J must be used to describe the data set. For WYLBUR listings it can be done with TRCs or the WYLBUR marker commands, FONT, SELECT, and MAP.NEWFONT. (For information on these marker commands, refer to the *WYLBUR Document Formatting* manual.)

The TRCs occupy a column to the left of the text, following the optional carriage control column. A TRC of blank or "0" is used to select the first font; "1" selects the second font.

The following example uses "0" and "1" in the TRC column to print a small table in 15-pitch characters when the rest of the text is printed with the PR12 font.

```
0Often within output, it is desirable to be able to switch to a
0smaller character set such as the Gothic Text 15-Pitch which allows
0a table that might be too wide to fit on the page.
0
1Data Group 1    Data Group 2     Data Group 3     Data Group 4
1exercised       exercised        sedentary        sedentary
1normal weight   overweight       normal weight    normal weight
1non-smoker      smoker           non-smoker       smoker
1normal bp       normal bp        normal bp        hypertensive
```

The printed output would appear as follows:

Often within output, it is desirable to be able to switch to a smaller character set such as the Gothic Text 15-Pitch which allows a table that might be too wide to fit on the page.

Data Group 1	Data Group 2	Data Group 3	Data Group 4
exercised	exercised	sedentary	sedentary
normal weight	overweight	normal weight	normal weight
non-smoker	smoker	non-smoker	smoker
normal bp	normal bp	normal bp	hypertensive

The DD statement for the output data set could be:

```
//GO.OUTPUT DD SYSOUT=A,
//  DCB=(BLKSIZE=130,RECFM=F,OPTCD=J),CHARS=(PR12,GT15)
```

To mix two fonts within a line, TRCs and carriage control must be used. As the next example shows, a "+" carriage control character in column 1 can cause a line printed in one character set to be overlaid with characters from another.

```
0This is a test of trc characters and      fonts on the
+1                                     dual
0continuous form printer.  It will show how trc characters
1can be used to create font changes within lines as well
0as between lines.
```

The printed output would be:

```
This is a test of trc characters and dual   fonts on the
continuous form  printer.  It will show how trc characters
can be used to create font changes within lines as well
as between lines.
```

The following DD statements describe the output data set:

```
//SYSPRINT DD SYSOUT=A
//SYSLIST DD SYSOUT=A,
//   DCB=(BLKSIZE=80,RECFM=FA,
//   OPTCD=J),CHARS=(SN10,GB10)
```

The record format (FA) indicates that the data set contains carriage control characters in column 1. Remember that the program must write the TRCs in front of each line of the output.

This text could be listed from WYLBUR with the following command:

LIST TRC CC DEVICE=3800-10 DENSITY=6 CHARS=(SN10,GB10) UNN
FORMS=STD

9.14 UNDERSTANDING PRINTING OPTIONS

The following section contains illustrations designed to make understanding the default printing options easier.

9.14.1 Default Values for Printing Options

The following table shows the default values for some of the options which may be specified on the /*JOBOUT and /*DDOUT JES2 control statements to control the processing of printed output. For more information on /*JOBOUT and /*DDOUT, refer to *Batch Processing and Utilities at the NIH Computer Center*.

Figure 9-5. Default Values of Printing Options

Option	Continuous Form Laser Printer	Cut-sheet Laser Default	Impact Default
FORMS	STD (11x8 1/2)	900P (8 1/2 x11	—
CHARS	SN12	SN10	SN10
EJECT	Y	Y	Y
DENSITY	8		
PAGE			

9.14.2 Interactions of Printing Options

Printing options are not completely independent of one another. Changing the value of one may result in another's default value changing. There are two reasons for this. First, some of the output facilities are limited to one type of printer. For example, the laser printer cannot print across a page perforation; therefore, specifying EJECT=N will result in the output being produced on an impact printer (IMPACT=Y). Second, common usage of some options mandates changes in others. For example, forms other than the 11 x 8 1/2 inch laser standard paper are most frequently used with the SN10 character set; thus, specifying any form other

than STD will result in CHARS=SN10 and DENSITY=6 being automatically set. The figure below shows these interactions. When multiple parameters are specified, the new values for all affected options are merged.

Figure 9-6. Interactions of Printing Options

Parameter Specified	Parameters Affected and Their New Default Values	
FORMS (other than STD, 900L, 999L, or labels)	CHARS=SN10	DENSITY=6
FORMS (labels)	CHARS=SN10 IMPACT=Y	DENSITY=6
CHARS (12-pitch or 15-pitch)	FORMS=STD	DENSITY=8
EJECT=N (for labels only)	DENSITY=6 IMPACT=Y	CHARS=SN10
DENSITY=6	PAGE=45	
DENSITY=8 and FORMS (other than STD, 900L, 999L, or labels)	PAGE=80	
DENSITY=10	PAGE=75	
DENSITY=10 and FORMS (other than STD, 900L, or 999L)	PAGE=100	
PAGE (greater than the default)	IMPACT=Y DENSITY=6	CHARS=SN10
IMPACT=Y	DENSITY=6	CHARS=SN10

9.15 GRAPHICS AND PLOTTING

CIT supports the popular SAS/GRAPH plotting package. Direct all questions concerning this software to TASC.

The central system's laser printers can be used to create plots with a resolution of 240 x 240 pixels per inch on "laser standard" 8 1/2 x 11 inch forms. Such "page mode" printing is done from the SYSOUT data sets without incurring spooling charges or the delays associated with magnetic tapes. However, higher CPU requirements may more than offset any savings.

A wide variety of graphics terminals and plotters can be used with the graphics software available at the NIH Computer Center. Users are encouraged to obtain such equipment through standard procurement channels. It is prudent to check the documentation for the software to be used and to have the vendor provide a demonstration of its successful use before ordering equipment. See Section 14.4 for information on interfacing non-standard devices with Computer Center services.

9.15.1 Installation of Non-NIH Graphics Packages

Users contemplating the installation of any other graphics packages (acquired from the manufacturer of a plotting device, a software house, another vendor, etc.) are referred to Section 5.2.5. It is strongly recommended that only NIH Computer Center-supported interfaces to the various graphic devices be used. Lower level, unsupported interfaces may be changed at any time in the process of upgrading the graphics display facilities offered by the NIH Computer Center. Since these are considered to be internal interfaces, such changes would take place without any public notice or advance warning. Moreover, Service Request Tickets will be accepted on any problem that a user may encounter when employing one of the packages supported by the NIH Computer Center. The Technical Assistance Support Center (TASC) will not, however, look at any problems that may arise when employing software that is not supported by the NIH Computer Center.

10 BATCH JOB SERVICES

The batch processing facility of the OS/390 (MVS) South System allows users to submit a job or computer program to the mainframe processors. Users can then print the output or examine it at their desktop workstations. WYLBUR's ENTER SUBMIT command requests that a batch job be submitted automatically at a specific time every day, every weekday, one day per week, or on one given date. ENTER SUBMIT also has an option to suspend the running of jobs on holidays. See Section 12.6 for information on ENTER SUBMIT.

To submit a batch job through the World Wide Web, use the Web Submit facility at:

http://silk.nih.gov/submit

For additional information on Web Submit, see Section 12.6.2.

The NIH Computer Center provides an extensive set of batch utility programs to aid the user in the areas of data management and manipulation. Refer to *Batch Processing and Utilities at the NIH Computer Center* for complete information on running batch jobs, job class summaries, job turnaround times, job control language statements and the procedures for using batch utility programs.

10.1 OPERATING SYSTEM OVERVIEW

The IBM System 390 MVS Operating System, now named OS/390 by IBM, introduces programs to the computing system, initiates their execution, and provides all the resources and services necessary for the programs to carry out their work. The operating system is made up of a general library of programs that can be tailored to meet many requirements. The installation can select the systems programs that it needs, add its own programs to them, and update existing programs as needs change.

For illustrative purposes, the programs and routines that compose the operating system are classified as a control program and processing programs. The main functions of the control program are to accept and schedule jobs in a continuous flow (job management); supervise on a priority basis each unit of work to be done (task management); and simplify retrieval of all data, regardless of the way it is organized and stored (data management). The processing programs consist of language translators (such as the FORTRAN compiler), service programs (such as the Binder), and problem programs (such as users' programs). The processing programs are used to define the work that the computing system is to do and to simplify program preparation. For a description of the operating system currently in use at the NIH Computer Center, see Section 8.1.

10.2 JOB CONTROL LANGUAGE OVERVIEW

In order to run a batch job at this installation, instructions are sent to the operating system through job control language (JCL). JCL allows the user to communicate with the operating system to tell the computers what to do with programs, data sets, and I/O devices. Some job

control statements used at the NIH Computer Center are specific to this installation. JCL is critical for getting batch jobs on and off the computer; therefore, every batch user must understand JCL. Additional information can be obtained from the *WYLBUR Batch Processing* manual, available through the CIT publication ordering facility.

10.3 MAXIMUM LIMITS FOR BATCH JOBS

The following overview defines maximum limits for batch jobs.

Figure 10-1. Maximum Limits for Batch Jobs

LIMITS FOR A SINGLE JOB	
Number of steps	255
Number of instream procedures	15
Region (below the line)	6144K
Lines output	4 million
Cards punched (default 6,000)	4 million
Scratch disk space allocated at one time (tracks)	100,000
Contention suspension	30 min.
Lines output at Remote 8	5,000
LIMITS ON NUMBER OF JOBS FROM ONE USER	
Total jobs in the system	150
Jobs AWAITING EXECUTION and EXECUTING	50

In addition to the "below the line" region requested by the REGION parameter (below the 16-megabyte line in virtual storage), each job is automatically assigned at least 96MB (98,304KB) of requestable virtual storage above the 16-megabyte line (requiring 31-bit addressing for use).

The limits on numbers of jobs apply to jobs submitted by a single user. These limits are necessary to prevent overloading the operating system queues and to allow timely processing of jobs for all users. The limit on total jobs includes jobs in all categories (AWAITING EXECUTION, EXECUTING, AWAITING PRINT, IN OUTPUT HOLD, etc.). Jobs awaiting output (print or punch) for more than two weeks will be purged.

A maximum of 100,000 tracks (4,747,600,000 bytes) of public disk scratch space can be allocated to a job at any one time. Space allocated to a temporary data set that is passed among the steps of a job is counted as part of this total until it is deleted. If a job exceeds the maximum, it will be canceled, and no refund will be allowed.

The following maximum limits for batch jobs have more restrictive standards in most job classes.

CPU time	20,000 seconds
Region (above the line)	512MB
Tape drives in use at one time	7
Reel tape drives in use at one time	2

10.4 RESTRICTIONS AT NIH

The following job control language parameters should not be used at this facility:

JOB statement	**EXEC statement**	**DD statement**
ADDRSPC	ACCT	AMP
CLASS	ADDRSPC	BURST
GROUP	DPRTY	CHKPT
NOTIFY	DYNAMNBR	DSID
PASSWORD	PERFORM	DYNAM
PERFORM	RD	FCB
PRTY	TIME	FLASH
RD		FREE
TIME		HOLD
TYPRUN		MODIFY
		MSVGP
		OUTLIM
		PROTECT
		QNAME
		SUBSYS
		TERM
		UCS

The DCB, LABEL, SPACE and UNIT parameters all have some restrictions on their use at NIH. For more detailed information on NIH restrictions on the use of IBM utilities, see the manual *Batch Processing and Utilities at the NIH Computer Center*.

In addition, any JES3 parameters not supported by JES2, all JES3 statements, and the following JES2 statements should not be used:

command statements
JOBPARM
SETUP
SIGNOFF
SIGNON

10.5 JOB CLASS SUMMARY

Batch jobs running at NIH are divided into classes depending on the amount of system resources and operator intervention they require. It is basic to the philosophy of the NIH Computer Center that the class of a job is influenced only by these factors. For the specific standards for the various job classes, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

Figure 10-2. Job Class Summary

	CPU TIME (seconds)*	LINES PER JOB (1000s)	REGION**	TYPICAL*** PROCESSING TURNAROUND	SERVICE**** LEVEL OBJECTIVES
Class A					
Maximum	10	4000	6144K	10 sec.	21 sec.
Default	10	20	4096K		
Class E					
Maximum	20000	4000	6144K	24 sec.	1 min. 40 sec.
Default	150	20	4096K		
Class B					
Maximum	100	4000	6144K	1 min. 14 sec.	3 min. 30 sec.
Default	100	20	4096K		
Class C					
Maximum	20000	4000	6144K	1 min. 33 sec.	6 min. 30 sec.
Default	150	20	4096K		
Class F					
Maximum	9999	4000	6144K	N/A	N/A
Default	200	4000	N/A		
Class H					
Maximum	20000	4000	6144K	N/A	N/A
Default	300	20	4096K	N/A	N/A

Notes:

* CPU time is specified in 3090 J seconds.

** In addition to any requested region "below the line" in the 24-bit address space, all jobs are automatically assigned 96MB in the 31-bit address space.

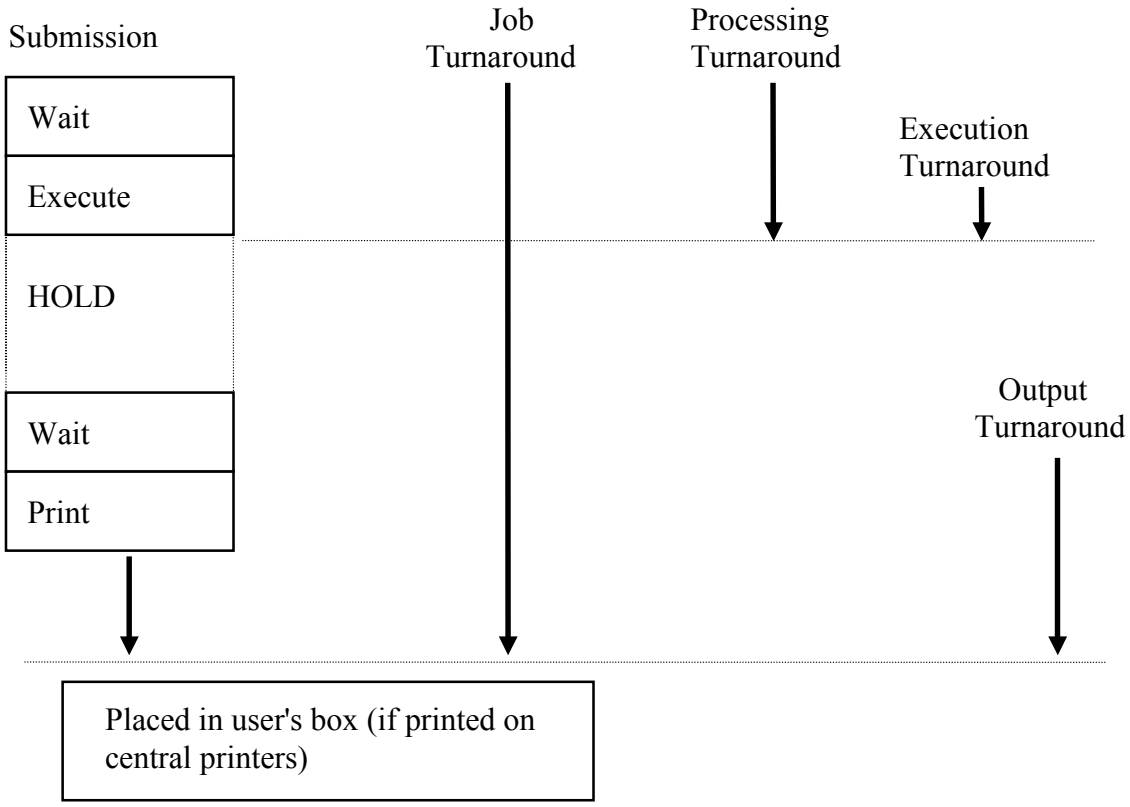
*** "Typical" processing turnaround times are the median turnaround times observed from 10/1/94 through 12/31/94 for jobs that were run (submitted and completed execution) from 9:00 a.m. to 4:00 p.m.

**** The Service Level Objectives are the "not-to-exceed" targets for mean execution times for the job classes during peak business hours. See Section 10.5.1 for more information.

10.5.1 Job Turnaround

Job turnaround has several phases that are explained below.

Figure 10-3. Phases of Job Turnaround



Processing turnaround is the time that elapses from when a job is submitted until it has completed execution. Processing turnaround includes execution turnaround, which is measured from the time a job starts executing until it is completed.

The Service Level Objectives, shown in Figure 10-2 are expressed as the average (mean) execution times for jobs that completed execution during peak business hours (between 10:00 a.m. and 11:00 a.m. and between 2:00 a.m. and 3:00 p.m. on business days). The NIH Computer Center uses these Objectives as targets for system performance and strives not to exceed these limits.

When a job has completed execution, it may enter output HOLD (from which the user can FETCH the output and selectively examine it at a workstation) or it may be placed in a queue to be printed.

Output turnaround is from the time a job enters the print queue until the output has been placed in the user's output box. This time can vary widely depending on the services chosen.

For jobs printed at the central facility with the standard printing requirements (see Section 9.1), the time for the job to be printed, separated from other jobs, and placed in the user's output box will normally be two hours or less during non-discount periods.

Delivery times are also quite variable; including at times delays for messenger pick-up and redistribution within the user's building.

WYLBUR's LOCATE command can be used to trace the progress of a job. For additional information, see the *WYLBUR Fundamentals* manual.

10.6 UTILITIES AND CATALOGED PROCEDURES

The utility programs available at the NIH Computer Center include IBM utilities, utility programs from other installations, and CIT-written utilities. Cataloged procedures have been set up for some of these programs to make certain common requests easier to perform. The tasks performed by utility programs include:

- manipulating cataloged data sets (CATDS, UNCATDS, DSSCR, VDSUTIL). (e.g., cataloging and uncataloging data sets on disk or tape, scratching multiple cataloged data sets, renaming multiple cataloged data sets)
- printing and listing data sets (PRINT, DSLIST, EDSLIST, USRPDSL, PDSLIST, DDSLIST, POSTSCRP)
- sorting and merging data sets (SORT, EDSSORT, MERGE)
- scrambling and unscrambling data sets for security purposes (DSSCM, DSUNSCM)
- comparing data sets (COMPARE)
- transmitting tape data to or from remote workstations (RMTDSIN, RMTDSOUT)
- obtaining data set information (ADSMAP) (e.g., LRECL, BLKSIZE, data set organization, space allocation, key length, option codes specified in the DCB parameters)
- erasing sensitive data (ADSERASE)
- data set manipulation for EDIT and non-edit format data sets (COPY, DSCOPY, EDSUTIL) (e.g., extracting portions of files, copying files, changing the DCB characteristics of files while copying)
- tapes and tape data set utilities (TAPEMAP, TAPECOPY, PALTAPE, VOLSTAT) (e.g., printing labels of a tape, scanning for block count and size of largest block, copying, analyzing or printing a problem tape, changing a tape's status, releasing or preventing release of a tape)
- disk data set utilities (ADSRECOV, DISKSAVE, DISKGET, DSSAVE, DSCOPY, DSRENAME, DSSCR, DSLIST) (e.g., saving a disk data set on tape, copying a data set, copying a data set from tape to disk or disk to tape, renaming a data set, scratching a data set, listing a data set)
- maintaining dedicated disk volumes (DISKMAP, DISKSAVE, DISKGET, ADSRECOV)

- processing edit format sets with batch jobs (EDSIN, EDSOUT, EDSSORT, EDSLIST)
- using the Binder to prepare executable programs from object modules
- using the Loader (an economical alternative to the Binder)
- submitting batch jobs (DSSUBMIT)
- scanning for JCL errors (JCLSCAN)
- listing last month's computer bill (PASBILL)
- creating generation data sets
- executing WYLBUR as a batch job
- host-to-host file transfer to exchange information with other computer centers (SENDFILE, RCVFILE)

Since these procedures are designed to meet the standards of the NIH Computer Center, it is important that each batch user be aware of their existence and capabilities. The utility programs are intended to address the requirements of the general user community, and are provided so that individuals will have a common method of performing frequently needed data manipulation tasks. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for further information about the utility programs.

10.7 MICROFICHE SERVICES

The NIH Computer Center offers users the ability to produce output on microfiche. The software packages provided for microfiche production are described in Section 10.7.1 and Section 10.7.2.

Features of the service include:

- high speed printing (approximately 20,000 lines/minute)
- universal film format
- equipment produces clear image (lettering) on a dark opaque background, for both originals and duplicates
- 106 character set
- forms flashing

Microfiche offers advantages over paper for high volume output. Filing and retrieval are easier because the storage space is 1/50 that for paper and because visible titles can be provided. The reduced bulk also makes disposal easier. Finally, each step: generation, filing, retrieval and disposal is less expensive than handling the same data on paper.

A /*ROUTE XEQ FICHE statement, described in the manual *Batch Processing and Utilities at the NIH Computer Center*, is required in every batch job that uses microfiche.

A Micro tape cannot be reused until the microfiche have been produced. If a Micro tape is created in error, the user may call Output Distribution Services and ask that the output be canceled, provided the final processing phase has not been entered.

The user must have an appropriate viewer to read microfiche output.

10.7.1 P360

P360 is used to direct output to microfiche. Since it does not permit titling or indexing, it is used mainly for archival output. P360 receives Level 2 support.

The microfiche documentation is available from the CIT publication ordering facility (Utilities). See Section 6 for information on ordering publications.

10.7.2 EZFORM/PTFORM

EZFORM/PTFORM is a software package used to obtain titling and indexing on 105mm microfiche with 24x, 42x or 48x reduction. The EZFORM package is dynamically loadable and can be invoked from a PL/I, COBOL, or Assembler Language program and pass lines of print data directly to the program. PTFORM is provided for processing an existing data set. EZFORM/PTFORM receives Level 2 support.

The EZFORM/PTFORM documentation is available from the CIT publication ordering facility (Utilities). See Section 6 for information on ordering publications.

11 NETWORK SERVICES

Network connectivity has become an essential tool for the biomedical, clinical, and administrative communities at NIH, other government agencies, and organizations worldwide. NIHnet is the high-speed network backbone that interconnects NIH LANs, the NIH Computer Center's central servers, and international data networks. NIHnet, supported by CIT, supports the TCP/IP, AppleTalk, IPX, and DECnet communications protocols.

See Section 7.1 for the Internet host names for NIHnet access to the central systems. Section 7.2 contains the Internet Numbers (numerical IP addresses) for the NIH domain name servers. These numbers are required for configuring network software packages.

CIT supports Parachute, a service that offers high-speed dialup connectivity to access NIHnet. See Section 7.3.3.3 for more information on Parachute.

11.1 NIHNET CONNECTIVITY

A NIHnet connection provides reliable, high-speed access to a wide variety of network services. Users with personal computers and workstations on NIHnet-connected LANs can use TCP/IP software to perform high-speed file transfers (FTP), submit batch jobs, take advantage of client/server database management systems, send e-mail worldwide, transmit files to the high-speed mainframe printers, and initiate line-by-line telnets or full-screen sessions (via TN3270) to the OS/390 (MVS) System. See Section 7.2 for information on network access to Computer Center services, Section 7.4.1 for transferring files over the network, and Section 12.1 for electronic mail supported by the OS/390 (MVS) System.

Users with NIHnet-connected desktop computers can back up their data to the OS/390 (MVS) System using the NIH Backup and Recovery Service (NBARS) using ADSM software. See Section 13.7 for information.

NIHnet provides high-speed electronic communications among a multitude of LANs in every Institute and Center (IC) of the NIH. The topology of the NIHnet backbone uses redundant connections and equipment locations to provide more resilience and resistance to outage. To ensure sufficient capacity for data requirements, the NIHnet has a T3 (45Mb/second) primary connection to the Internet. Other agencies that use the NIH Computer Center can also request a connection to NIHnet. A portion of NIHnet resides in the machine room of Building 12, including the electronic mail gateway, the Internet connections, and gateways to other networks in HHS.

For every LAN connected to NIHnet there is a technical LAN coordinator (TLC). Users on a LAN connected to NIHnet who have connectivity problems should first contact their TLC for assistance. The TLC works with CIT in the event of a networking or connectivity problem between a LAN and its NIHnet connection. For additional information on technical LAN coordinators, see Section 5.2.3.

CIT supports the NIHnet infrastructure or backbone. Each IC is billed monthly for NIHnet services, based on 1/12 of the ICs' annual total cost, through a CIT Service and Supply Fund Account. A smaller part of the installation and support of this backbone is funded by the NIH Management Fund.

CIT-supported NIHnet-based services include:

- Central Email Service (CES)—provides e-mail services for the NIH community. The CES provides e-mail, scheduling, and other messaging services to the NIH. NIH users are encouraged to take advantage of this service. There is no direct charge for this service to NIH ICs. More information can be found at http://www.mail.nih.gov.
- Domain Name Service—the Domain Name Servers (DNS) are networked computers that translate Internet names, such as wylbur.cu.nih.gov, into the IP addresses necessary to make the connection. NIH users can register hostnames and make other DNS changes via the Web. See Section 7.2 for more information.
- FAXSERV—a fax transmittal system that allows users to send faxes directly from the network. FAXSERV is available to all e-mail users on NIHnet. (WYLBUR users can give the FAX command in ENTER MAIL.)
- Listserv facility—supports online groups via e-mail and the Web. See Figure 11-1.
- NetNews Service—news.nih.gov is available to all NIH users for reading and posting Usenet news. To access newsgroups, you need news reader software.
- NIH Backup and Recovery Service (NBARS)—allows NIHnet-connected users to back up and recover data stored on LAN servers and desktop computers. See Section 13.7.
- NIH Cable Modem Service—cable access to the NIH network (http://cablemodem.nih.gov).
- NIH Directory and E-mail Forwarding Service—e-mail directory for NIH. See Section 11.4 for more information.
- NIHnet IP Multicast services—videocasting to the desktop (http://videocast.nih.gov).
- NIHnet Mail Gateway System—a set of gateways allowing the exchange of electronic mail between the different systems supported at NIH. See Section 11.5.
- Parachute (PPP & Apple Remote Access Central Highspeed User Telecommuting Engine)—a service supported by CIT that offers high-speed dialup connectivity to access NIHnet. See Section 7.3.3.3 for more information on Parachute.
- PrintShare—a service developed and supported by CIT that allows networked PC, Unix, and OS/390 (MVS) System users to print to the nearest networked AppleTalk printer.
- PUBnet—a collection of network services available via the NIHnet. PUBnet provides software distribution (freeware, shareware, NIH site-licensed software) for MacOS users, security/virus information for both the Windows and Macintosh platforms, and NIH-approved electronic forms available for download (http://pubnet.nih.gov).

- SDP—(Software Distribution Project) distributes licensed software to the NIH Community and HHS personnel (http://sdp.cit.nih.gov).
- Windows Internet Name Service (WINS)—provides WINS servers that can be accessed by Windows clients throughout NIH.

In addition, there are NIH-supported services and general Internet services. The variety of NIHnet-based services reflects the heterogeneous nature of the NIH environment, and of the Internet as well. Despite their variety, however, these network services have one thing in common: NIHnet is the conduit by which they are delivered to users at NIH. (In addition, most are also TCP/IP-based.) For more information on specific NIHnet-supported services, contact TASC.

For additional information on NIHnet services, go to:

http://www.net.nih.gov

This Web site includes other useful NIHnet-related information such as the names of the technical LAN coordinators.

Other network-related publications are available through the CIT publication ordering facility. See Section 6.

11.2 INTERNET

The Internet is the most extensive high-speed network in the world encompassing millions of users at hosts worldwide, all of which transfer information using TCP/IP protocols. The Internet is used heavily by research scientists to exchange papers, data, and information relating to ongoing research and other topics of interest.

Each member of the Internet is assigned a unique host name. See Section 7.1 for the Internet host names used by the NIH Computer Center.

The TCP/IP protocols used on the Internet are used by many NIHnet-connected LANs. With the appropriate software, NIH research investigators and administrators on TCP/IP-based NIHnet-connected LANs can access worldwide Internet services such as information browsing, file transfer (ftp), remote login (telnet), e-mail, directory services, and network news.

World Wide Web

One of the most popular services of the Internet is the World Wide Web, which provides access to a multimedia collection (text, images, video, and sound) of hyper-linked documents. Users with a NIHnet connection and browser software (such as Netscape Navigator or Microsoft Explorer) on their workstations can access the World Wide Web. Users on the Helix System can also access the World Wide Web through Lynx, a non-graphical Web browser. A Uniform Resource Locator (URL) describes where an Internet object, such as a document or a "Homepage," is located and what protocol is needed to access it.

Many CIT and NIH Computer Center facilities now take advantage of the Web. The Web will serve as the "front end" to more and more applications in the future. All users of the NIH Computer Center should have browser software on their desktop computers in order to: download software, learn the identity of their TLCs, read documentation (including the *NIH Computer Center User's Guide* and *Interface*), order manuals, look up an e-mail address, register for a training course, submit a Service Request Ticket, use RACF, change account information (for account sponsors), and learn about-or take advantage of many other CIT services.

SILK (Secure Internet LinKed) Web technologies, supported by the NIH Computer Center, allow users to set up customized SILK Web servers for their organizations. In addition, virtually all OS/390 (MVS) data can be accessed through the Web. For information on SILK see Section 8.5 or visit:

http://silk.nih.gov

Contact TASC for further information concerning World Wide Web-related services.

See Figure 11-1 for a directory of World Wide Web sites that may helpful to Enterprise System users.

Figure 11-1. World Wide Web Service Directory

Service	World Wide Web Address
National Institutes of Health	http://www.nih.gov
Center for Information Technology	http://cit.nih.gov
Molecular Modeling	http://cmm.info.nih.gov/modeling
PUBnet	http://pubnet.nih.gov
NIH Computer Center	http://datacenter.cit.nih.gov
ALW	http://www.alw.nih.gov
Helix	http://helix.nih.gov
Account Information	http://helix.nih.gov/register.html
NIH Biowulf Cluster	http://biowulf.nih.gov/
Enterprise	http://datacenter.cit.nih.gov/enterprise.html
OS/390 Titan (Standard System)	http://silk.nih.gov/silk/titan
OS/390 South System	http://datacenter.cit.nih.gov/mvs
Service Request Ticket	http://datacenter.cit.nih.gov/srt
RACF	http://silk.nih.gov/racf
SILK Web	http://silk.nih.gov
DB2 and Oracle	http://silk.nih.gov/dbtech
OS/390 North System	http://datacenter.cit.nih.gov/mvs
RACF	http://silkad.nih.gov/racf
SILK Web	http://silkad.nih.gov
Coordinator	http://silkad.nih.gov/coordinator
Enterprise Open Systems (Unix)	http://datacenter.cit.nih.gov/eos
NT Application Servers	http://datacenter.cit.nih.gov/nt
NIH Backup and Recovery Service	http://silk.nih.gov/silk/nbars
Oracle License Information	http://silk.nih.gov/silk/oracle
Oracle Database Servers	http://silk.nih.gov/silk/citoracle
Publications	http://datacenter.cit.nih.gov/pubs.html
Web Sponsor Account Information	http://silk.nih.gov/sponsor/homepage
Customer Services	
Accounts	http://dcs.cit.nih.gov/accounts/ca.htm
Computer Training	http://training.cit.nih.gov
TASC	http://dcs.cit.nih.gov/tasc/tasc.htm
Network Services	
Listserv	http://list.nih.gov
NIHnet	http://www.net.nih.gov
Parachute	http://parachute.nih.gov

11.3 DIMES NETWORK

The DIMES (Departmental Information Management Exchange System) VTAM network, a facility that serves the Department of Health and Human Services, is available to users of TCP/IP for a full-screen (TN3270) connection via NIHnet. (See Section 7.1.) Connect to

DIMES by typing DIMES on the SNS/TCP logon menu screen. In addition, DIMES is accessible via the NIH Computer Center's VTAM network. From a terminal connected to the NIH Computer Center's VTAM network, type DIMES on the VTAM logon menu screen. For further assistance, call TASC.

Specific information on the North System VTAM access menu is available in Interface 209.

http://datacenter.cit.nih.gov/interface/interface209/

11.4 NIH DIRECTORY AND E-MAIL FORWARDING SERVICE

The NIH Directory and E-mail Forwarding Service is accessible from all computers connected to NIHnet, including PCs, Macintoshes, Unix workstations, the NIH Helix Systems and the OS/390 (MVS) System. This service is also available to Internet users around the world who correspond with researchers at NIH. The service uses CSO Nameserver software. In addition to its directory query and e-mail forwarding capabilities, the software offers flexibility in terms of adding new categories of information, and allows individuals to update their own directory information.

Each person in the directory is identified by name and preferred e-mail address, as provided by their computer system or network administrator. Individuals can provide additional information such as telephone numbers, postal mail addresses, institute affiliations, position titles, nicknames, fax numbers, pager numbers, and miscellaneous information. Each user who is entered into the directory also receives a unique NIH identifier that includes the suffix NIH.GOV. This identifier serves as an Internet address and is the most dependable electronic mail address to advertise.

The Directory Service can be accessed in several ways:

- World Wide Web

  http://directory.nih.gov

- electronic mail
- a ph client pointed to the ph.nih.gov server

WYLBUR users and others whose mail systems have direct connections to Internet mail (the mail systems on Helix, Unix workstations, and Central Email Service servers) can send mail queries to:

lookup@nih.gov

To query the directory, the subject line should contain the query, which can be a full name, a last name, or some combination using wildcards. For example, for a user named Marie Antoinette, any of the following queries will match:

Marie Antoinette
Antoinette
Mar* Antoinette
Mar* Anto*

(Queries such as "Marie" or "M*A*" would work, but would probably return more matches than would be useful)

Return mail will contain the results of the lookup.

In addition to being a central repository for e-mail addresses, the service provides an e-mail forwarding service that operates for mail sent to the Internet address nih.gov. When an e-mail message is sent to someone at NIH, a standard address format can be used, providing that the user has a UNIQUE name within the NIH community. The format is as follows:

Firstname_Lastname@nih.gov

For example, to send a message to NIH employee Charles Osgood, you would address the message to "Charles_Osgood@nih.gov" from most mail systems. The e-mail forwarding service looks up Charles Osgood in the directory and redirects the e-mail message to the e-mail address where he reads his mail.

The forwarding service allows users to move from machine to machine without having to send out "change of e-mail address" messages to correspondents each time. The e-mail address in the style Charles_Osgood@nih.gov, will always be valid (as long as the name remains unique at NIH).

For users with common names, such as John Smith, the NIH unique id or the preferred mailing address should be used. Mail sent using the common address format to a user whose name is not unique will bounce back to the sender. The accompanying error message will include the directory entries for all NIH community members with that name. Each entry's "alias" field contains the unique NIH identifier that can be used as the e-mail address.

Individuals are responsible for the accuracy of the information about themselves in the Directory Service. When a name is added to the directory for the first time, only limited information about the person is available. The user can provide additional information or make corrections through the World Wide Web or by e-mail. Users of any NIHnet-connected computer should send a mail message to request a "change" form, edit the form as needed, and return the modified form to be processed. WYLBUR users and others whose mail systems have direct connections to the Internet should send mail to:

change@nih.gov

No subject or message is required. The empty message is the request for a change form. The service will send back the contents of your directory entry as the body of the reply mail message. Use your mail program to edit this mail and send it back. The directory information is updated immediately and the new information is instantly available to others.

If you are an NIH employee or a contractor working for NIH, and your name does not appear in the directory, ask your system administrator to contact CIT by sending e-mail to phadmin@nih.gov.

Note that the NIH Directory and E-mail Forwarding Service and the *NIH Telephone and Service Directory* (i.e., the NIH phone book) are not related. Changes or additions appearing in one will not necessarily be reflected in the other. To update information in the NIH phone book, employees should contact their Administrative Officers.

For additional information, refer to the publication, *NIH Directory and E-mail Forwarding Service*, which is available from the Directory Web page (http://directory.nih.gov). You can also access this publication by sending an e-mail message to dir-guide@nih.gov.

11.5 NIHNET MAIL GATEWAY

The NIHnet Mail Gateway System is a set of gateways that allows the exchange of electronic mail among users of all mail systems supported at NIH and between NIH users and other users on the Internet. The NIH mail systems include: the Central Email Service (CES), VMS Mail, WYLBUR's ENTER MAIL, and Helix mail systems. Note: not all NIH mail systems support the exchange of attachments.

11.6 VTAM PRINTER SUPPORT SYSTEM (VPS)

This section describes the VTAM Printer Support System (VPS) for printing files transmitted from NIHnet-connected desktop computers to the OS/390 (MVS) mainframe printers and for printing files that reside on the OS/390 (MVS) mainframes to local NIHnet-connected printers.

11.6.1 OS/390 (MVS) Printing to a Local Printer Using an LPD Server

The VTAM Printer Support System (VPS), for mainframe-to-network printing, allows users to print output from the OS/390 (MVS) System to a local printer. Printed output from Delpro and other ADB services, DB2, WYLBUR, and batch jobs can be produced on printers attached to a PC, workstation, or local area network (LAN) connected to NIHnet and running an LPD server.

Local printers (print queues) that have not been used for six months will be removed from the table of queue names and flagged for reissue. Contact TASC if there are any questions concerning this policy.

AppleTalk printers are also supported in conjunction with the PrintShare services provided by CIT (see below).

VPS converts OS/390 (MVS) print output into a TCP/IP print request conforming to the Berkeley Line Print Daemon (LPR/LPD) standard. This LPR print request is then sent from the OS/390 (MVS) System to the appropriate networked LPD server. One printer can be shared by many users, or one printer can be used exclusively by one user.

The LPD server must be configured locally and registered with CIT prior to being used by VPS. Users are responsible for setting up the local LPD server. An IBM PC-compatible environment requires at least Windows 3.1, Windows 95/98, or NT. You can also run LPD from the command line in DOS; however, this dedicates the PC to only running the LPD server. Almost any Unix LPD server can be used.

Additional Information

- The form required to register your LPD printer for VPS is available from the Web at:

  http://silk.nih.gov/silk/vps

Macintosh Printing Using PrintShare

PrintShare, a NIHnet service developed and supported by CIT, allows networked PC, Unix, and OS/390 (MVS) System users to print to the nearest networked AppleTalk printer. A computer that can send LPR print requests can send those requests to a networked AppleTalk-capable printer (such as an Apple LaserWriter or a HP LaserJet 4Si) using PrintShare.

PrintShare can be used with VPS to send OS/390 (MVS) mainframe print jobs, such as Administrative Data Base (ADB) print reviews and WYLBUR listings, directly to a networked AppleTalk printer. For further information, or to register an AppleTalk printer for PrintShare, call TASC or visit:

http://silk.nih.gov/silk/vps

11.6.2 Mainframe Printing Using TCP/IP

Workstations connected to NIHnet or the Internet can transmit files via TCP/IP for printing on the OS/390 (MVS) System's mainframe printers. Two techniques can be used: LPR and SITE SUBMIT.

LPR

When using the LPR facility of TCP/IP software, the first line of the file must contain the printing description information, beginning with "X-PRT: " prefix, followed by some or all of the following operands, separated by commas:

*ACCT=account number	CIT account number
*INIT=initials	registered initials

*KEYWORD=keyword	keyword for account and initials specified
*BOX=box-number	box number to receive output
PRINT=remote-number	RJE remote to receive output
REMOTE=	(same as PRINT)
FORMS=forms-name	form to be used for printing
CHARS=character-set	character set to be used for printing
PAGE=lines-per-page	lines per page to be used for printing
COPIES=number	number of copies to be produced
DENSITY=6,8, or 12	lines per inch to be used for printing
DUPLEX	double-sided printing
TITLE=quoted-string	title to be specified on separator page
DISCOUNT	request discount for cut sheet or page printing

*required operand

If none of these optional operands are specified, the output will be printed at the central site on standard 8 1/2- x 11-inch forms (landscape-oriented, tractor feed paper) at a density of 8 lines per inch. If 900P, 999P, 900L, or 999L forms or DUPLEX is specified, output will be printed on the cut-sheet printers. For example,

X-PRT: ACCT=AAAA,INIT=III,KEYWORD=KKK,BOX=999,COPIES=5

produces 5 copies of the output on standard forms, for account AAAA, initials III, and would be placed in output box 999.

X-PRT: ACCT=AAAA,INIT=III,KEYWORD=KKK,BOX=999,FORMS=999P

produces the output printed on 999P forms.

All the printing description parameters must be on the first line of the output. All lines following that are considered part of the file to be printed. Also, if there are errors in the specifications, the user will receive the error indication in the output of the batch job that is run.

Users should consult the documentation for their TCP/IP software to determine how to invoke the LPR (line printing) interface, which is used to transmit files for printing. The server name specified in the lpr command should be LPR.CU.NIH.

After issuing the lpr command, the contents of the file will be transmitted to the central printers. No acknowledgement of a successful or unsuccessful transmission is sent. The output from the submitted job will be placed in the specified box or printed at the specified remote. For more information about printing on the central printers, see Section 9.

SITE SUBMIT

The NIH OS/390 (MVS) FTP Server's SITE SUBMIT command can be used to print files on the high-speed laser printers at the NIH central facility. The JCL for printing a file on the mainframe on the continuous form laser printer would look like the following:

```
//iii JOB (aaaa,bbb,A),yourname
/*KEYWORD=kkk
// EXEC COPY //COPY.SYSUT1 DD *
(your file goes here)
//COPY.SYSUT2 DD SYSOUT=A
```

This JCL will print your file on the continuous form laser printer on 11" x 8.5" STD forms.

Printing on a different form (such as 900P or 900L on the cut sheet printer) would require slightly different JCL, such as the following:

```
//iii JOB (aaaa,bbb,A),yourname
/*KEYWORD=kkk
// EXEC COPY
//COPY.SYSUT1 DD *
(your file goes here)
//COPY.SYSUT2 DD SYSOUT=(A,,900P),CHARS=CR10,COPIES=2
```

This second example prints 2 copies of the data set on the 900P cut sheet forms using the CR10 character set.

In the above examples, users would change iii to the registered initials, aaaa to the associated account, bbb to the output box, kkk to the keyword and would include their name. As with all JCL, this must be in upper case. These three lines must be the first three lines in the data set. If they are not, the job will be flushed from the system prior to printing.

After making the appropriate changes to the data set, the file must be uploaded to the print queue on the OS/390 (MVS) System. This is accomplished by using the FTP client on the local host to connect to the NIH OS/390 (MVS) FTP Server. Once logged in, the command QUOTE SITE SUBMIT must be sent to the FTP Server to tell it that the next file to be transferred should be submitted as a batch job. (On some systems, SERVER SITE SUBMIT is implemented on the local client FTP instead of QUOTE SITE SUBMIT.)

Once the SITE SUBMIT command is issued, simply transfer the file using the usual PUT or SEND command (if you must supply a name for the file on the remote host, don't worry, it will be ignored). The file will be printed on the high-speed laser printers at the central facility and will be placed in the output box indicated in the JCL.

12 INTERACTIVE FUNCTIONS

A number of services are provided to users of the NIH Computer Center through automated systems, using the World Wide Web or WYLBUR's ENTER facility. These easy-to-use interactive systems perform otherwise complex tasks.

12.1 MAINFRAME E-MAIL

Electronic mail can be exchanged via the OS/390 (MVS) mail facilities (through WYLBUR or the World Wide Web via SILK facilities) with colleagues and co-workers at NIH and throughout the world. **Note:** The preferred electronic mail service supported by CIT is the Central Email Service (CES). The CES provides e-mail, scheduling, and other messaging services to the NIH community. NIH users are encouraged to take advantage of this service. There is no direct charge for this service to NIH ICs. See Section 11.1 or contact TASC for further information.

12.1.1 WYLBUR's ENTER MAIL Command

The ENTER MAIL command in WYLBUR provides easy-to-use, sophisticated mail handling and transmission facilities. It is designed to be useable with no prior WYLBUR (or mainframe) experience. ENTER MAIL offers an inexpensive and powerful electronic mail system for anyone with a modem and a workstation, or whose workstation is on a NIHnet-connected LAN. ENTER MAIL handles mail sent via WYLBUR, Helix, the NIH Computer Center's NIHnet Mail Gateway, the Central Email Service (CES), and the Internet. With ENTER MAIL you can read each piece of mail (called a "mail item") individually, discard it, file it, fax it, reply to it, or forward it to another mail service (such as the mail system on a LAN). For information on forwarding mail from the ENTER MAIL facility to other e-mail systems, see Section 5.4.1.

12.1.2 SILK Web Mail Facilities

There are several electronic mail functions available through SILK. For more information on SILK (Secure Internet LinKed) Web technologies, see Section 8.5.

SILK WEB Easymail

Mainframe-based e-mail can be sent through the World Wide Web using the SILK (Secure Internet-LinKed) Easymail facility. Go to:

http://silk.nih.gov/easymail

Web page developers can add e-mail to their pages using a hypertext link to Easymail. To invoke Easymail from a Web page, use the following HTML coding:

```
<a href=http://silk.nih.gov/easymail>
Send e-mail</a>
```

Clicking on the "Send e-mail" link would display the Easymail form.

You can also have e-mail sent to a pre-specified e-mail address by including "?to=" in the HTML (hypertext markup language) coding. For example, if you wanted to send to the "webmaster@my.site.gov" address, include the following code:

```
<a href="http://silk.nih.gov/easymail?to=webmaster@my.site.gov">
Send e-mail to Web Master</a>
```

In this case, the Easymail form would be initialized with "webmaster@my.site.gov" as the To: address.

Formsmail
Formsmail is a SILK facility that sends information collected using an online Web form directly to a specific, predetermined e-mail address. With Formsmail, a registered user can set up a form on any Web server (including SILK Web customized servers) and receive the resulting information via e-mail. For further information, see Section 8.5.5.

WYLBUR E-mail Forwarding
To reroute your WYLBUR mail to another mail system, go to:

http://silk.nih.gov/wylbur/reroute

Your browser will prompt you for your username (i.e., your account and initials). This facility also allows users to view their e-mail forwarding address and to stop forwarding WYLBUR e-mail. In addition, when using the Web Sponsor facility, an account sponsor may specify a forwarding address for all WYLBUR mail when requesting new user initials.

12.1.3 NIH Directory and E-mail Forwarding Service

NIH directory services are accessible from all computers connected to NIHnet, including PCs, Macintoshes, Unix workstations, the Helix Systems and the OS/390 (MVS) System, ENTER MAIL. This service is supported by CIT.

The directory services can be accessed through the Web at:

http://directory.nih.gov

WYLBUR users and others whose mail systems have direct connections to Internet mail (the mail systems on the Helix, Unix workstations, and Central Email Service servers) can send mail address queries to:

lookup@nih.gov

Note that the NIH Directory and E-mail Forwarding Service and the *NIH Telephone and Service Directory* (i.e., the NIH phone book) are not related. Changes or additions appearing in one will not necessarily be reflected in the other. To update information in the NIH phone

book, employees should contact their Administrative Officers. For additional information concerning the NIH directory services, see Section 11.4.

12.1.4 Mailing Documents Created on a PC

To upload and mail a PC-created document using NIH Kermit with WYLBUR, the document must first be saved on the PC as a DOS text file. Using Word Perfect, this is accomplished via the text-in/text-out facility (Ctrl-F5), and choosing option 1 (text-out). Once this has been done, sign onto WYLBUR, give the ENTER MAIL command, and follow this simple procedure:

- Type SEND in response to the Command? prompt
- When you are asked to create your mail, press ALT-x to get into Kermit, the prompt will be Kermit-MS>.
- Issue the command, SENDWYL pc-file-name. The file whose name is specified as "pc-file-name" will be transferred one line at a time.
- When the transmission is finished and the Kermit-MS> prompt appears, type CONNECT to return to WYLBUR.
- Press Alt-B, if you receive the message TERMINAL OR TRANSMISSION ERROR, RETYPE LINE, press Alt-B again.
- Type END in response to the ">?" prompt. You will then be asked to specify the options for sending the mail to the addressee.

Terminal emulators other than Kermit also provide this type of uploading, known as "raw file uploading" or "nonprotocol file transfer." Any DOS text file can be transmitted in this fashion. Examples of other types of DOS text files include Lotus 1-2-3 ".PRN" files, and files created with Personal Editor 2.

Using the PUSH command of NIH Kermit, it is actually possible to create your mail using the word processing software package of your choice during the sending process. Before issuing the TRANSMIT command, type the PUSH command. Control will be passed to DOS, where you can create the mail with your word processing software and save it in DOS text format. After exiting the word processing software, type EXIT to return to Kermit. From there, proceed with the TRANSMIT command and finish the mailing process.

For additional information on NIH Kermit see Section 7.3.3.1 or the NIH Kermit manuals.

12.1.5 Addressing Electronic Mail

On the Internet, each user has a unique identifier of the form

userid@address

where "userid" identifies the individual user, and "address" is the network address of the institution. For the e-mail received at the NIH OS/390 (MVS) facility (via ENTER MAIL), the "userid" is the user's registered initials.

For mail sent to a "userid" through the Internet, the "address" of the recipient is the "Internet domain name" of the recipient's institution. For incoming Internet mail, CU.NIH.GOV is the OS/390 (MVS) facility's "Internet domain name." The address for NIH user III would be:

iii@cu.nih.gov

Only mail, not interactive messages or attachments, can be transferred between the OS/390 (MVS) mail system (ENTER MAIL) and other nodes on the Internet.

The Helix Systems at NIH are also connected to the Internet. Mail to a Helix user should be sent to an address of the form:

username@helix.nih.gov

Users who wish to receive mail through the Internet must supply to all senders their userid (initials) and Internet domain name (CU.NIH.GOV). The NIH Computer Center does not have access to userids of users at other computer sites. That information must be obtained from someone at the receiving site.

For information on obtaining electronic mail addresses and other information on NIH computer users, see Section 11.4 for a full description of the NIH Directory and E-mail Forwarding Service.

12.2 PASSWORD SECURITY AND DATA SET PROTECTION

The Resource Access Control Facility (RACF) allows users to change passwords and control access to data sets stored on direct access devices (disks) on the OS/390 (MVS) South System. This facility is fully described in Section 4.5. RACF can be accessed through the World Wide Web using the SILK Web RACF facility. RACF processing over the Web requires that you enter your account/initials combination and password.

Web RACF allows users to perform the following functions:

(The actual RACF command is shown in parenthesis.)

- change RACF password

In the RACF Profiles area:

- protect a data set (ADDSD)
- delete data set protection (DELDSD)
- add user to access list to data set (PERMIT)
- remove user from access list (PERMIT)
- change Universal Access (UACC) (ALTDSD)
- change owner of RACF profile (ALTDSD)
- display data set profiles by prefix (LISTDSD)
- display RACF profile for a data set (LISTDSD)
- display if a data set is protected and if you have access

In the RACF Groups area:

- create a RACF group
- delete a RACF group
- add users to a group (CONNECT)
- remove users from a group (REMOVE)
- change owner of a group (ALTGROUP)
- display attributes, including users in a group (LISTGRP)
- display groups containing user (LISTUSER)

In the Authorization area:

- authorize others to protect your data (CONNECT)

- unauthorize others to protect your data (REMOVE)
- display users authorized to protect your data (LISTGRP)

For RACF processing via the Web, go to:

http://silk.nih.gov/racf

12.3 SERVICE REQUEST TICKETS

Users who encounter difficulties while using the OS/390 (MVS) South System can submit online Service Request Tickets to describe problems and request refunds, as well as to communicate suggestions, comments, and needs. The information from Service Request Tickets helps the NIH Computer Center staff formulate future policies, plan systems changes, and inform users of common trouble areas. Service Request Tickets can deal with any software, hardware, network connection or service supported by the NIH Computer Center. They can also be used to request refunds. Use one of the following methods to submit a Service Request Ticket:

- Go to:

  http://datacenter.cit.nih.gov/srt

- Send e-mail to tasc@nih.gov

For full details on Service Request Tickets, including the submission procedures, see Section 5.2.2.

12.4 DOCUMENTATION AND SOFTWARE REQUESTS

The CIT Technical Information Office offers a sophisticated documentation service designed to provide users with current OS/390 (MVS) and Helix Systems publications as well as certain supported software for personal computers. The CIT publication ordering facility manages subscription requests and provides subscribers with updated manuals when they are published. Users can opt to pick up publications themselves, have them picked up by a messenger, placed in an output box, or mailed. See Section 6.1 for a listing of OS/390 (MVS) System topics included in the system. Users can access the publication ordering facility through the World Wide Web.

To order publications through the Web, simply provide your account/initials combination and fill out an online order form. You can also renew your subscriptions via the Web. To order publications and view many CIT manuals in their online form, visit:

http://publications.cit.nih.gov

12.5 CIT ACCOUNT INFORMATION AND CHANGES

Web Sponsor (http://silk.nih.gov/sponsor/homepage) is the account management tool for CIT accounts. It uses SILK (Secure Internet-LinKed) Web technology. Officials can display information for OS/390 (MVS) accounts (as well as for certain other CIT services) and search by Common Account Number (CAN) or user name or registered initials. Web Sponsor allows account officials make changes to their accounts and user information.

To ensure proper security, the account sponsor and alternate, and the deregistration official and alternate must designate "preferred" initials for their accounts. For information on designating preferred initials, see Section 2.1.2.5.

Web Sponsor helps account officials manage their CIT accounts. Sponsors and deregistration officials can use Web Sponsor to display information about a specific account, all accounts, or all accounts under a specific CAN. Web Sponsor allows deregistration officials and alternates to reset RACF passwords online without submitting a Service Request Ticket or faxing a request to the security investigators. When a new password is chosen, it becomes effective immediately. Some changes must be approved and processed by CIT Customer Accounts. Following each change request, Web Sponsor informs users whether the change occurred immediately or if e-mail will be sent at a later time when the change takes place. The comment facility allows users to send comments to CIT at the time the request is processed.

The first time account sponsors or deregistration officials make a selection, a security "pop-up" window prompts for username and password. The user should enter the account/initials combination (e.g., aaaaiii) as the username and the RACF password for the initials specified as the password. **Note:** preferred initials of a valid primary or alternate sponsor or deregistration official must be used. The username and password need not be reentered on subsequent requests in the same session.

Web Sponsor allows account sponsors to perform many functions including the following:

For Customers

- change a password
- add new customers
- display and change customer information
- validate, remove, reassign, and request new initials
- register and remove users for certain CIT services (e.g., Helix, ALW, Parachute, cable modem connections)
- access the CIT Web billing system
- specify a forwarding address for WYLBUR mail when requesting new user initials
- display a customer log

For Accounts

- close account
- change sponsors
- display log and information by account
- change CAN (Common Accounting Number) account title and number

Miscellaneous

- send e-mail
- view documentation

12.6 SUBMITTING BATCH JOBS

The interactive facilities that can be used to submit batch jobs are:

- ENTER SUBMIT—a WYLBUR command to request automatic batch jobs submission on a regular schedule set up by the user
- Web Submit—a SILK Web facility for submitting batch jobs through a Web browser

12.6.1 Scheduled Automatic Batch Job Submission Through ENTER SUBMIT

WYLBUR's ENTER SUBMIT command is used to request that a batch job be submitted automatically at a specific time every day, every weekday, one day per week, or on one given date. ENTER SUBMIT also has an option to suspend the running of jobs on holidays. The user simply supplies the name of a cataloged data set containing the JCL (including a /*KEYWORD statement) that is to be submitted. ENTER SUBMIT allows the user to set up the job submission schedule. The job can be submitted every day, every weekday, one day per week, on the first weekday of each month, the last weekday of each month, a specific day (e.g., the 22nd) of each month, or on only one specific date.

For example, if the user requests one day per week, a prompt for the day of the week will be issued. The user will then be asked for the date on which the job is first to be submitted, the last date the job is to be submitted, and the time of day desired for the submission. Once all this information has been entered and verified, the request is queued for inclusion in the system submission data set (updating the system submission data set can take as long as 15 minutes).

Every 15 minutes, the batch submission processor (a constantly running system program) updates the system submission data set and submits any user batch jobs that are scheduled for that time. The submission data set is then updated to indicate the date on which the jobs should next be submitted. Thus, batch jobs may be submitted up to 15 minutes after (never before) the time specified.

The first time the batch submission processor submits a job, it creates a cataloged data set named aaaaiii.@ENTER.SUBMIT.LOG, where aaaaiii is the account and initials from the data set name being submitted. For each automatic job submission attempt, an entry is put into the log. Entries appear in the log in newest-to-oldest order and show the time and date of submission, the name of the data set submitted, and the resulting action (normally, JOB SUBMITTED). If an error occurs while submitting the job (for example, no JOB or KEYWORD statement in the JCL), the error message will appear in the log.

To add, clear, or show submission requests, the user must know the keyword for the account and initials of the data set name containing the JCL. Since the keyword for the account and initials on the JOB statement must be included in the data set submitted, it is recommended that this data set be RACF protected with a Universal Access (UACC) of NONE. (Refer to Section 4.5 for information on RACF.) The batch submission processor will still be able to submit the protected job, but unauthorized persons will not be able to access the data set.

12.6.2 Web Submit

To submit a batch job through the World Wide Web, direct your browser to SILK's Web Submit facility at:

http://silk.nh.gov/submit

When the Web form appears, enter an OS/390 (MVS) data set name to be submitted as a batch job and specify the appropriate options—including remote print routing, impact printing, DISCOUNT, HOLD, NOTIFY, as well as BEFORE, AFTER or CNTL.

The data set must have the record format FB (fixed-length records, blocked) with LRECL=80. **Note:** the data set can not be in WYLBUR edit format. If the data set is RACF protected, the initials specified in the browser security window must have authority at least to "read" that data set.

When you submit the job, the job number is displayed. If the job is rejected for some reason, that information will also be displayed. To find why the job was rejected, you must look at the printed output or fetch the job through WYLBUR or TSO.

For further information on submitting batch jobs and using the Web Submit facility, refer to the manual *Batch Processing and Utilities at the NIH Computer Center*. For additional information about SILK (Secure Internet-LinKed) Web technologies, see Section 8.5.

12.7 ACCOUNTING INFORMATION

Data Warehouse

To view billing information through the Web, go to the CIT-supported Data Warehouse Web facility at:

http://www-dw.cit.nih.gov/dwpas/

The NIH Data Warehouse provides a centralized repository for information related to budget and finance, procurement, travel, property, research contracts, grants, human resources, service and supply fund, NIH training, and CIT billing. See Section 3.9 for more information.

PAS ONLINE
The interactive accounting information system, PAS (Project Accounting System) ONLINE, displays summary reports based on charge records for one year for account sponsors and users. PAS ONLINE, which runs under the DB2 system, consists of QMF (Query Management Facility) procedures that produce billing reports. For full information about the features and capabilities of PAS ONLINE, see Section 3.9.1.

12.8 NIH GUIDE ACCESS

Current and past versions of the *NIH Guide to Grants and Contracts* can be searched interactively using the World Wide Web. Scientists and researchers seeking information about the NIH extramural program can examine the online version of the NIH Guide even before the hardcopy version is available. Visit:

http://www.nih.gov/grants

and select the *NIH Guide to Grants and Contracts.*

12.9 RECALLING OLD DATA SETS

All data sets created or restored after April 18, 1994 are managed by HSM (Hierarchical Storage Management). Data sets that were migrated before April 18, 1994 are managed by the old migration system. Currently, data sets created since July 8, 1984 are still available.

Due to technical considerations, this old migration system will be discontinued by the end of 1999 and the data will be moved under the control of HSM. Data sets created or restored after April 18, 1994 are unaffected by this move. Invalid or duplicately-named data sets will cause problems and will be handled on a case-by-case basis. More information is available on the Web at:

http://datacenter.cit.nih.gov/interface/interface209/migration.htm

ENTER RESTORE
For data sets migrated before the implementation of HSM on April 18, 1994, use either WYLBUR's RETRIEVE command or the ENTER RESTORE command to bring migrated data sets back to online volumes for active use. ENTER RESTORE is also used to restore data sets from Computer Center backups. ENTER RESTORE enters a dialog with the user,

listing all incremental backups and migration copies for each named data set and prompting for all required information.

ENTER RECALL
For data sets created after April 18, 1994, ENTER RECALL prompts the user for the data set name and then submits a batch job to recall it from tape. When the job is done, a WYLBUR interactive message is sent to the user stating that the data set is now available.

If a data set has been staged to tape, WYLBUR will return the message

```
datasetname CANNOT BE ACESSED - STAGED TO TAPE
PLEASE USE "ENTER RECALL" TO RECALL THIS DATA SET
```

For additional information refer to Section 13.1.5.

12.10 TELEPHONE AND NAME DIRECTORIES

There are several online telephone and name directories available. If you have access to the World Wide Web, use the SILK Web Locator. WYLBUR users can give the ENTER NAMES and ENTER PHONE commands to find directory information.

12.10.1 Web Access to Directories

The SILK Locator provides account and directory information through the World Wide Web. This facility allows users to learn the names of the account sponsors and deregistration officials for a CIT account. It also displays directory information by user name or by the user's registered initials. In addition, the SILK Locator has links to the NIH E-mail Directory Service, the NIH Telephone Directory, and the HHS Employee Directory. For additional information, see Section 1.3.2, or visit:

http://silk.nih.gov/locator

12.10.2 WYLBUR Access to Directories

WYLBUR users can access telephone directories through the ENTER PHONE and ENTER NAMES command.

ENTER PHONE

The information in the NIH Telephone Directory is available for interactive searching via WYLBUR's ENTER PHONE command. This command allows a person to display the name, phone number, organization , address, and mail stop of anyone at NIH. If the person about whom information is being displayed is a registered user at the NIH Computer Center, their initials can also be displayed. Using WYLBUR's ENTER PHONE command, you can search the NIH phone book and the NIH Computer Center User Directory for one or more names. In addition, the organizational listing "Green Pages" of the NIH telephone directory can be searched by content.

For example:

```
? ENTER PHONE(ENTER)

Welcome to the NIH Computer Center's Phone Directory
Locator

Select one of the following options:
    1 -- Search the NIH Phone Directory (White Pages)
    2 -- Search the NIH Computer Center User Directory
    3 -- Search all of the above
    4 -- Display users by organization from the NIH
         Computer Center User Directory
    5 -- Search NIH organizational listing (Green Pages)
    6 -- Display guidelines for directory searching
  END -- Terminate directory searching

Option: 3(ENTER)

Enter the name (last name, first name) of the person you
wish to locate, or "?" for help. Press BREAK to terminate
or ENTER to select a new directory.

Name: EMELMON, GEORGE(ENTER)

== NIH PHONE DIRECTORY ==

Name                Phone     Organ.    Address    M/S

EMELMON GEORGE    555-1111   CIT        44 2241B   1234

   == NIH COMPUTER CENTER (NIHCU) USER DIRECTORY ==

Name           Initials     Phone    Organ.   Address

EMELMON, GEORGE   E5G   301-555-1111 CIT   44  2241B
```

```
Enter the name (last name, first name) of the person you
wish to locate, or "?" for help.  Press BREAK to
terminate or ENTER to select a new directory.

Name: (BREAK)
```

If you do not know how to spell the complete last name, or do not know the first name of the person, ENTER PHONE will return all names that begin with the characters specified in response to the "Name:" prompt. For example, responding EMELM to the "Name:" prompt will display anyone whose last name begins with those characters. Likewise, EMELMON, G will display everyone whose last name is Emelmon and whose first name begins with G.

A set of public initials, IHN on account ZPPZ, is available to allow those who are not registered users to sign on to WYLBUR and access the directories.

ENTER NAMES
For most registered NIH Computer Center users, the information in the NIH Computer Center Directory can be accessed from WYLBUR with the ENTER NAMES command, specifying either the person's name or registered initials. Users can also submit address and telephone number changes to ENTER NAMES.

The NIH Computer Center Directory can also be accessed through ENTER MAIL. The commands within ENTER MAIL are:

SHOW NAME lastname, firstname
SHOW INITIALS iii

For information on ENTER MAIL, see Section 12.1.1.

Note that these services are separate from the NIH Directory and E-mail Forwarding Service described in Section 11.4.

12.11 OFFLINE DATA SET LISTING

To print an OS/390 (MVS) data set through the World Wide Web, direct your browser to SILK's Web Listoff facility at:

http://silk.nih.gov/listoff

A form appears that enables you to specify a data set name and select offline listing options—including box number, remote printer number, DISCOUNT, HOLD, IMPACT, PUNCH, and SCRATCH (if you wish to scratch the data set after it is listed).

Once you have completed the form, click on the "Submit" button. The job number of the batch job submitted to create the listing will be displayed.

With SILK Web's Listoff facility you may list the data sets that your initials (specified in the account/initials field of the browser security window) have authority to read. Any non-VSAM data set—**except** those in WYLBUR edit format—may be listed offline. The submitted job is run with the RACFid of the initials specified. The listing will be sent to the specified output box or remote printer.

For further information on printing, see Section 9. For additional information about SILK (Secure Internet-LinKed) Web technologies, see Section 8.5.

13 STORAGE AND BACKUP OF DATA

The NIH Computer Center offers a complete spectrum of direct access storage facilities. Public storage in the DASD (direct access storage device) environment offers disk drives that are shared by all users to permit online storage of data sets, short-term storage (five days), and scratch space (for use during the processing of a batch job). Dedicated online disks may be available to users who need to access very large amounts of data. Anyone who needs storage capabilities that are not available via public storage should call TASC to discuss their requirements. See Section 13.2 for information on the special circumstances under which dedicated disks may be used.

Magnetic tape facilities are available, both for data storage at the NIH Computer Center and for data exchange with other installations. The NIH Computer Center has an automatic tape inventory system that ensures the privacy and integrity of data on tapes.

Data sets on direct access volumes can be security-protected with RACF; see Section 4.5 for information. Any user who handles or stores personal data as defined by the Privacy Act of 1974 has legal responsibilities for maintaining its security and integrity. For further information, see Section 4.

The NIH Computer Center does not provide for archival storage of data (inactive for more than 18 months). Data to be archived should be copied to tape and permanently removed from the NIH Computer Center. For more information on the use of tapes, refer to:

- the manual *Using Tapes at NIH*
- http://silk.nih.gov/silk/tapes

For information on exchanging disk data with other computer centers, see Section 7.4.7.

13.1 PUBLIC DIRECT ACCESS STORAGE

The System Managed Storage (SMS) environment for data storage provides public direct access facilities to the user. SMS, which operates within an all-cataloged environment, facilitates storage management and provides simplified data set allocation, economical flexibility in the maintenance of disk data sets, high performance, and the facility for easy transitions to new disk architectures.

Under this system at NIH, there are three management classes for public data sets: FILE, TMP, and MSS. Data is managed at the data set level rather than at the volume level, therefore data sets from the different management classes can coexist on the same physical volume. The specific management class determines which data sets are to be backed up, how long the backups are kept after the data set has been scratched, and when a data set is to be staged to tape. Data sets are directed to pools of volumes based on space requirements rather than management criteria.

The direct access storage is on RAMAC (logical 3390) online disks. The various types of storage have differing restrictions on the length of storage time and backup service. The FILE and TMP management classes provide permanent and short-term storage for most data sets. The MSS management class provides slightly less expensive storage for data sets that do not require backup. Dedicated online disks are private volumes under control of their users.

HSM (Hierarchical Storage Manager), which is a part of SMS, manages data sets on groups of storage volumes. HSM keeps new and actively used data sets on a group of "primary" disk volumes, moving less frequently accessed data sets onto HSM-owned "secondary" disk volumes and tapes. HSM keeps track of where each FILE, TMP, or MSS data set resides, recalling inactive data sets from the secondary volumes when they are accessed by WYLBUR, TSO, or batch jobs. Data sets are moved ("staged") off primary volumes as space is needed, and are "recalled" automatically by the system as they are accessed.

When a public data set is created, it is placed on one of the primary disks. When the disks start getting full, the least active data sets are moved from the primary volumes to secondary volumes. While they are on these secondary volumes, the catalog indicates that the data sets are on a volume named MIGRAT. When WYLBUR, TSO, or a batch job references (via the catalog) a data set that has been moved to secondary storage, the data set is automatically brought back to one of the primary volumes. With WYLBUR and TSO, there is a short delay while HSM moves the data set from the secondary volume back to a primary disk.

When moving a data set from secondary storage back to primary in order to meet a batch job's request, HSM must allocate space on a primary public volume for the data set. HSM uses two techniques for that allocation. For a sequential or partitioned data set that has a secondary space allocation, HSM will allocate only the amount of space actually occupied by the data, releasing any unused space. For all other data sets, HSM will allocate the total space previously allocated, whether occupied by data or not. HSM always condenses partitioned data sets when bringing them back to primary storage volumes, moving all members to the beginning and all unused space to the end of the data set. In general, it is recommended that users include a secondary space allocation when creating sequential and partitioned public data sets so that space will only be allocated to their data sets as it is actually needed.

There is no way to guarantee that a data set will remain on any particular disk volume or that two data sets will always be on different volumes. SMS determines which disk in the primary group to use when the data set is returned, and updates the catalog appropriately.

The NIH Computer Center operates in an all-cataloged public disk storage environment. All FILE, TMP, and MSS data sets are cataloged, and all references to data sets on public disks are made through the catalog. Give the TSO command LISTCAT or the WYLBUR command SHOW DSNAMES ON CATALOG for a list of all of your public data sets. The WYLBUR command SHOW DSNAMES FULL provides descriptions of data sets. See Section 13.1.4.1.

Users need to understand how the catalog operates to avoid accessing the wrong version of a data set and to avoid repeated reruns caused by confusion in creating public data sets. It is also critical that users examine the JES2 JOB LOG of any job that creates a data set.

It is important to remember the following:

- All data sets must be cataloged.
- Neither UNIT nor VOLUME should be specified when referencing existing, properly cataloged data sets. Just specify DISP=SHR and the DSN.
- If a data set cannot be cataloged (probably because another data set with the same name is already cataloged), the job will fail and the data set will not be created.

The batch procedures CATDS, DSSCR, and DSRENAME are described in the manual *Batch Processing and Utilities at the NIH Computer Center*.

TSO and WYLBUR commands can be used to SCRATCH existing FILE, TMP, and MSS data sets.

There are several advantages to using direct access facilities instead of tapes:

- There is no delay in the processing of a job while tapes are fetched from the library. The direct access volumes are always mounted and available. (Even when a data set is recalled from tape, access is generally quick.)
- Several jobs can read the same data set at the same time. A tape can be used by only one job at a time.
- Jobs may fit in a higher priority class since no tapes are required.
- Jobs accessing the data will be less expensive because the charging factors for tapes will be avoided. See Section 3 for specific details on costs.
- Public data sets that have been staged to tape can only be accessed through a batch job or TSO. They cannot be directly brought back through WYLBUR.

Computer Center utilities and procedures must be used to access the Volume Tables of Contents (VTOCs) on all public data sets. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*. Using unauthorized imported software for this purpose may violate security regulations.

Figure 13-1. Characteristics of SMS Management Classes

Characteristics of SMS Management Classes			
Characteristic	**File**	**MSS**	**TMP**
Minimum data set size	1 track (approx. 56 KB)***	1 track (approx. 56 KB)***	1 track (approx. 56 KB)***
Accessible from WYLBUR or TSO	Yes	Yes	Yes
Maximum data set size	850** cylinders (approx. 689 MB***)	850** cylinders (approx. 689 MB***)	850** cylinders (approx. 689 MB***)
Recommended maximum block size	set by system	set by system	set by system
Types of allocation permitted	cylinder, track, block, records, bytes	cylinder, track, block, records, bytes	cylinder, track, block, records, bytes
New data sets automatically cataloged	Yes	Yes	Yes
Data set "staging"	Yes	Yes	Yes
Automatic "recall"	Yes*	Yes*	Yes*
Extent reduction	Yes	Yes	Yes
Computer Center backups	Yes	No	No
Automatic scratch	No	No	after 5 days

* Data sets are not automatically recalled from tape when they are accessed through WYLBUR.
** More space can be obtained if it is available. Additional space cannot be guaranteed.
*** Based on RAMAC (logical 3390) disk storage.

13.1.1 FILE Management Class - for Most Data Sets

The FILE management class is used to store TSO and WYLBUR data sets and permanent data sets that must be accessible to programs running in the batch.

Each night all new and changed data sets are backed up. Backups are kept for up to six weeks after a data set is scratched. As many as thirteen versions of each separately named data set are kept. Data sets can be recovered using WYLBUR's ENTER RESTORE command. For further information, see Section 13.1.6.

Data sets stored in the FILE management class are regulated by the following:

- The system automatically catalogs all new FILE data sets.
- Any size data set up to 12,750 tracks (850 cylinders or 689MB) is permitted. It is possible for a data set to validly exceed this limit (space permitting) by going into secondary extents.

- The names of all FILE data sets must follow standard IBM naming conventions and must begin with the user's account number and registered set of initials. For example, aaaaiii.MYDATA is a legal name if "aaaa" is the user's account number and "iii" is the user's set of registered initials. Data sets created through WYLBUR and TSO are automatically prefixed by the user's account number and initials. Naming conventions are detailed in the manual *Batch Processing and Utilities at the NIH Computer Center*.
- The NIH Computer Center does not support multi-volume disk data sets.
- Empty data sets will be scratched automatically after 10 days.
- All JCL creating FILE data sets must include UNIT=FILE and request cataloging of the data set (i.e., DISP=(NEW,CATLG)).

Data sets that violate the rules may be scratched and uncataloged without warning. Details on how to store data sets are in the manual *Batch Processing and Utilities at the NIH Computer Center*.

13.1.2 TMP Management Class - for Short-term Storage

The TMP management class can be used for data sets that only need to be stored for a short period of time. TMP data sets are scratched and uncataloged on a regular schedule, and no automatic backups are made. TMP files are kept for five calendar days.

Data sets that are in the temporary management class are regulated by the following:

- The system automatically catalogs all new TMP data sets.
- Any size data set up to 12,750 tracks (850 cylinders) is permitted. It is possible for a data set to validly exceed this limit (space permitting) by going into secondary extents.
- The names of all data sets in the TMP management class must follow standard IBM naming conventions and must begin with the user's account number and registered set of initials. For example, aaaaiii.MYDATA is a legal name if "aaaa" is the user's account number and "iii" is the user's set of registered initials. Data sets created through WYLBUR and TSO are automatically prefixed by the user's account number and initials. Naming conventions are detailed in the manual *Batch Processing and Utilities at the NIH Computer Center*.
- If a TMP data set is needed for a longer period of time, the management class can be changed by reassigning the data set to the FILE or MSS management class, by using the VDSUTIL procedure. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.
- The NIH Computer Center does not support multi-volume disk data sets.
- All JCL creating TMP data sets must include UNIT=TMP and request cataloging of the data set (i.e., DISP=(NEW,CATLG)).

Data sets that violate the rules may be scratched and uncataloged without warning. Details on how to store data sets are in the manual *Batch Processing and Utilities at the NIH Computer Center*.

13.1.3 MSS - for Data Sets not Requiring Backup

Backup service is not provided for MSS; it is recommended that critical data sets not be placed in this class.

Use of the MSS is regulated by the following:

- The system automatically catalogs all new MSS data sets.
- Any size data set up to 12,750 tracks (850 cylinders) is permitted. It is possible for a data set to validly exceed this limit (space permitting) by going into secondary extents.
- Standard IBM and Computer Center data set naming conventions must be followed. All data set names must begin with aaaaiii., where "aaaa" is the account number and "iii" is the programmer's registered set of initials. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.
- All JCL creating MSS data sets must include UNIT=MSS and request cataloging of the data set (i.e., DISP=(NEW,CATLG)).

13.1.4 Inactive Data Sets

The NIH Computer Center does not offer long-term archival storage for data. All data media (disks and tape) are for storage of active data that is used at less than 18 month intervals. Data that is inactive but must be kept for long periods of time should be copied to tape and transferred to the National Archives or a Federal Records Center.

13.1.4.1 HSM Functions

The NIH Computer Center uses IBM's Hierarchical Storage Manager (HSM) to manage its public disk storage facilities. For the FILE data sets, HSM is used to create backups of data sets each day they are changed. In addition, HSM stages FILE, TMP, and MSS data sets off primary volumes to secondary storage on an "as space is needed" basis. The data sets can be automatically recalled back to primary volumes when accessed.

Recalling Data Sets via WYLBUR

If a data set has been staged to tape (level 2), WYLBUR will return the message:

```
datasetname CANNOT BE ACCESSED - STAGED TO TAPE
PLEASE USE "ENTER RECALL" TO RECALL THIS DATA SET
```

ENTER RECALL, a WYLBUR utility, directs the system to recall the data set from tape to primary storage. ENTER RECALL prompts for the data set name and then submits a batch

job to recall it from tape. When the job is done, a WYLBUR "TO" message is sent to the user stating that the data set is now available.

Recalling Data Sets via Batch
Users who need to access large numbers of staged level 2 data sets can set up the following batch job to recall the data sets:

```
//stepname  EXEC  PGM=IEFBR14
//DD1   DD  DSN=dsn1,DISP=SHR
//DD2   DD  DSN=dsn2,DISP=SHR
//DD3   DD  DSN=dsn3,DISP=SHR
    .
    .
    .
//DDn   DD  DSN=dsn300,DISP=SHR
```

No more than 300 data sets should be recalled in a single batch job. The larger the data sets, the fewer the number that can be recalled in the batch job.

Data Set Disposition
Data sets that have been moved to secondary storage can be scratched by user request with WYLBUR's SCRATCH command. Data sets which have been backed up or migrated before April 18, 1994 can be returned with WYLBUR's ENTER RESTORE command or by WYLBUR's RETRIEVE command.

All data sets created or restored after April 18, 1994 are managed by HSM (Hierarchical Storage Management). Data sets that were migrated before April 18, 1994 are managed by the old migration system. Currently, data sets created since July 8, 1984 are still available.

Due to technical considerations, this old migration system will be discontinued by the end of 1999 and the data will be moved under the control of HSM. Data sets created or restored after April 18, 1994 are unaffected by this move. Invalid or duplicately-named data sets will cause problems and will be handled on a case-by-case basis. More information is available on the Web at:

http://datacenter.cit.nih.gov/interface/interface209/migration.htm

HSM performs its backup functions at least six nights a week. (Occasionally systems maintenance jobs cause it not to run on Sunday night). HSM provides two levels of compressed storage, disk storage and tape storage. Data sets being staged to secondary storage are moved to disks or tapes, depending on the age and size of the data set. Retrieving a data set from a disk is a very rapid process that typically takes less than one minute. Retrieving an older data set that has moved to tape or recovering a backup of a data set from 3480 magnetic tape cartridges will take longer (up to 30 minutes).

To determine whether a data set resides on a disk or on a tape, use the WYLBUR command SHOW DSNAMES FULL. If the result of this command shows that a data set is on MIGRAT, then it has been staged from primary disk storage to either migration level 1 on compressed DASD or to migration level 2 on tape. The DEVTYPE= field must then be examined to determine if the data set is on disk or tape. A data set on disk will have a value of "20" in positions 5-6 (from the left). A data set on tape will have a value of "80" in positions 5-6 (from the left).

In the following example, the dsname MY.FILE is on primary disk storage:

```
SHOW DSNS LIKE MY.FILE FULL

FILE
MY.FILE ON DSA010
UNIT=FILE, DEVTYPE=3010200E, NO. OF VOLUMES=1
CREATED 03/16/96, LAST USED 08/22/96
2 TRACKS (2 USED), NO. OF AREAS=1, SECONDARY SPACE=1
BLOCK
DSORG=PS, RECFM=U, LRECL=11476, BLKSIZE=11476
EXPIRATION DATE=00/00/00, NO PASSWORD
```

Users should take particular care to scratch unneeded data sets to avoid unnecessary data storage costs.

The WYLBUR command SHOW DSNAMES PAST displays information about data sets migrated before the implementation of SMS. Details on this command are given in the *WYLBUR Fundamentals* manual.

Data sets that were migrated before the implementation of HSM incur storage charges. To keep storage costs down, give the command SHOW DSNAMES PAST to list all old migrated data sets. The command SHOW DSNAMES PAST SCRATCH can be used to remove those that are no longer needed.

Before an account/initials combination is deactivated, WYLBUR's RENAME PAST command should be used to reassign data sets that were migrated before the implementation of HSM if those data sets will be needed.

13.1.5 Older Data Sets

For data sets migrated before the implementation of HSM on April 18, 1994, use either WYLBUR's RETRIEVE command or the ENTER RESTORE command to bring migrated FILE data sets back to online volumes for active use. ENTER RESTORE is also used to restore data sets from Computer Center backups. ENTER RESTORE enters a dialog with the user, listing all incremental backups and migration copies for each named data set and prompting for all needed information. RETRIEVE is quicker if the user already knows what to type. Migrated data sets that are brought back to public disks will be cataloged

automatically, whether or not the data set was originally cataloged. If necessary (for example, if the name is not catalogable or is a duplicate of an already cataloged name), the data set must be given a new name in order to be put on the public disk.

Data sets created on the MVS South System prior to 1995 (from the old migration system) have been moved to the current HSM system. New qualifiers have been automatically added to these data sets. Each data set that was moved to the current system has an additional qualifier added to the end of the data set name. The syntax of the qualifier is:

.Dyyddd (where **yyddd** is the year and day of the year of migration)

This final qualifier—for example ".D91208"will quickly allow you to identify which of your data sets were moved from the old migration system, and when it was originally migrated. Each data set has a unique name.

HSM does not allow qualifiers beginning with numbers or qualifiers exceeding 8 characters in length. Data set names not allowed in the current system have been corrected.

The new data set names are similar to the old names to aid users in identifying them. For example:

Old Data Set Name	**New Data Set Name**
AAAAIII.1.OLD	AAAAIII.#1.OLD.D92274
AAAAIII.VERYLONGNAME.OLD	AAAAIII.VERY.LONGNAME.D92347

Once a data set has been retrieved, the migrated version is kept for at least a week and is then removed from the system. (This cleanup is done on Sunday for migrated data sets that were retrieved or restored at least a week earlier.)

Examples:

```
RETRIEVE MYDATA
RETRIEVE OLD.CHART AS CHART2
RETRIEVE REPORT1 AND 88340/9999 AND RECORDS
ENTER RESTORE
ENTER RESTORE MYDATA,OLDFILE,88342/1000,MASTER
```

Once a data set has been retrieved from the past it will be placed under the System Managed Storage (SMS), which automatically recalls data sets back to a primary volume whenever they are accessed.

13.1.6 Incremental Backup and Recovery for Data Sets

The NIH Computer Center uses IBM's Hierarchical Storage Manager (HSM) to create incremental backups of data sets in the FILE management class each day they are changed.

Incremental backup is the process of backing up only changed data sets. A changed data set is defined as one that has been modified since the last backup run, created since the last backup run, or renamed since the last backup. A data set is considered to have been modified whenever the data set is opened for output, for input/output, or renamed, even if the data set is not actually changed.

HSM retains a maximum of 13 backup versions **per data set name**. Incremental backup is provided for data sets in the FILE management class, early each morning, to back up the previous day's changes. Backups will be kept for six weeks after the data set has been deleted (or renamed).

All changed data sets are backed up with the following exceptions:

- data sets with no DSORG (empty) or partitioned (PO) data sets with zero block size
- data sets that cannot be read (damaged PDS directory, etc.)
- data sets that are allocated with a disposition of OLD at the time HSM is trying to back them up

Incremental backups for a data set may be displayed using the BACKUP option of WYLBUR's SHOW DSNAME or SHOW DSNAMES commands. They may be recovered only with the ENTER RESTORE command.

While these backups provide a great amount of protection for user data sets, it is not absolute. Critical data sets should be periodically saved by the user on tape and removed from the NIH Computer Center premises. Copies of disk data sets can be created on tape using the appropriate version of the SAVE procedure. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for details on the SAVE procedures. See Section 4.3 for information about each user's responsibility for disaster protection of critical data.

The ADSRECOV procedure is used to recover data sets from a user's tape backup of a dedicated volume. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

13.2 DEDICATED DISKS

If necessary, users may have online disks dedicated for their exclusive (private) use (e.g., to store ISAM or multi-volume data sets). However, users of dedicated disks are encouraged to move their data sets to public storage whenever possible. Data sets on dedicated disks must be cataloged. Unlike tapes, disks cannot be exchanged with other installations. That is, disks cannot be removed from the computer room, and no disk from an outside source will be put on a Computer Center disk drive.

It is important to remember that dedicated disks are maintained by the individual users, not by the NIH Computer Center staff. Dedicated disks are not eligible for backup. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for maintenance

procedures for dedicated disks. While dedicated disks give users more control over their data sets, they have the following drawbacks:

- No incremental backups are made.
- They must be cataloged by the user.
- Individuals responsible for maintaining dedicated disks should perform frequent backups of these data sets to tape.
- All data set names must begin with aaaaiii., where "aaaa" is the account number and "iii" are the user's registered initials. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center* for further information on naming conventions.
- They will not be cost efficient when future system changes are in place. See Section 3.4 for the specific charging information.

A dump tape from another installation may not be restored directly to an NIH disk because possible changes in VTOC placement would cause severe system problems. The RECOVER ALL facility of the ADSRECOV procedure should be used. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center.*

13.2.1 Requesting a Dedicated Disk

Since relatively few users require private disks, requests must be individually approved. To request a disk, send a memorandum of justification with the following information to TASC at least 30 days prior to the date when the disk is needed:

- Explain why a dedicated disk is being requested instead of using tape or public direct access storage facilities.
- Define the type of data.
    - For disks which will not contain personal data: describe the data to be stored including the amount of data, the size and number of data sets, the size and number of records per data set, and the organization of the data sets (i.e., sequential, partitioned, direct, or VSAM).
- List the name, address, and telephone number of the person who will serve as the technical contact and be responsible for maintenance of the disk and all technical problems with it.
- Include the registered initials and CIT account to be charged for rental of the disk. The account sponsor must sign the memorandum.
- Provide the six-character volume serial number to be given to the disk.
- Provide the number of dedicated disks currently assigned to the account.

13.2.2 Releasing a Dedicated Disk

To release a dedicated disk, send a memo to TASC indicating the volume number of the disk and the date it is to be released. The memo must be signed by the account sponsor and received at least 30 days prior to the date when the disk is to be removed from service. The NIH Computer Center staff will not remove data sets from the volume nor release the volume until all data sets are removed by the disk owner.

13.3 PUBLIC SCRATCH DISKS

The NIH Computer Center makes up to 100,000 tracks of RAMAC (logical 3390) scratch disk space available for storage of temporary data sets by a batch job during execution. This allows for storage of over 5.7 billion bytes of data. Each track can hold 56,664 bytes of data; there are 15 tracks per cylinder. Any job that exceeds the scratch space limit is subject to cancellation.

For information on how to allocate space for temporary data sets, see the manual *Batch Processing and Utilities at the NIH Computer Center*. For details on the capacity of the disks, see Section 13.4. Remember that all temporary data sets are deleted at job end.

The 100,000-track limitation applies to the amount of disk space used by any one job at any single point within the execution of that job. The following method may be used to determine the maximum scratch space a job could require at any one time:

- Examine all DD statements which specify UNIT=SYSDA.
- Add the total of all primary space requests.
- Add the product of 15 times the total of all secondary space requests.
- Add in the space required by all passed temporary files.

13.4 ESTIMATING DIRECT ACCESS SPACE REQUIREMENTS

Rules governing allocation of space on the public direct access volumes are given in Section 13.1.

When allocating disk data sets, it is important to determine the best block size for the data set and the right amount of space needed to store the data. Specifying a block size that is too small or too large can lead to wasted disk space and increased storage costs. Specifying a block size that is too small can also cause an increase in I/O charges for the job that reads or writes the data set. Even if an efficient block size is selected, a miscalculation of the space (via blocks, tracks, or cylinders) needed to store the data can lead to wasted space and higher disk storage costs.

To allocate the proper amount of space for a disk data set, use a system-determined method of space allocation when the data set is created through batch processing. If you know the approximate number of records you expect to put in a data set and the length of the records

(or average record length for variable length records), the operating system can automatically calculate both the optimum block size and space required for most physical sequential (PS) and partitioned (PO) data sets. When a data set is created this way, it will be automatically reblocked to a new optimum block size if the data set has to be moved to a new DASD device with a different track/cylinder architecture.

The operating system can determine the appropriate direct access space requirements by using the AVGREC parameter when submitting the batch job that creates the data set. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

WYLBUR's ENTER DISKCALC command can be used to compute the optimal BLKSIZE for a disk data set. Although ENTER DISKCALC makes the block size and space calculations easier, this process can result in a block size that is not the most efficient for future DASD devices.

Refer to the manual *Batch Processing and Utilities at the NIH Computer* Center for suggestions on how to allocate space using the SPACE parameter.

13.5 TAPE STORAGE AND SERVICES

The Information Media Library maintains a large supply of magnetic tapes for use with the System 390 computers. These tapes are for storing active data only, not for archival storage of inactive or historical data. Refer to the publication *Using Tapes at NIH* for detailed information on tape services.

> **Note:** When the OS/390 (MVS) South System migrates to the "standard system" (called Titan), tape data set names will be required to begin with an account/initials combination (USERid or RACF group name). In addition, CIT strongly recommends that users begin cataloging all tape data sets.

Users and account sponsors should monitor tape use and keep only those tapes that are essential to active computing projects. Use the SET RELEASE option of the VOLSTAT procedure to release one or more of your assigned tapes. The VOLSTAT procedure is described in the manual *Batch Processing and Utilities at the NIH Computer Center.*

Once a tape is assigned to your account/initials, you may keep it and use it indefinitely. However, tapes are automatically released (removed from your use) after 13 months of inactivity. Users will receive two warnings, via ENTER MAIL, before their tapes are released. (If you don't use WYLBUR for e-mail on a regular basis, use ENTER MAIL's SET FORWARD command to forward your e-mail to your preferred electronic mailing address.) See *Using Tapes at NIH* for additional information.

In handling tapes while they are outside of the tape library, users should take care to protect them from damage during shipping. Tapes should be protected from the harmful effects of

heat, cold, and moisture, and should never be left exposed to direct sunlight on the rear window shelf or seat of a car. Tape manufacturers recommend that magnetic tapes be kept in a controlled environment for at least 24 hours before use, so it may be worthwhile to allow extra time after a tape arrives at the NIH Computer Center before using it. At times, tapes are returned from our libraries with "non-peel" labels or stickers affixed to them. Removing extraneous labels of this type is time consuming and requires the use of chemicals. If tapes need maintenance (i.e., removal of such labels or copying to an undamaged volume) they will not be available for use until time permits the maintenance to be done.

Tape owners can request extended security controls using RACF facilities to protect especially sensitive data. See Section 4.5.14. Users requiring data security on tape should also refer to the tape utilities in the manual *Batch Processing and Utilities at the NIH Computer Center*. Data can be removed from the NIH Computer Center, and stored by the user under secure conditions. The VOLSTAT procedure can be used to prevent a tape from being read, released, or transferred. Before a tape that contains data protected by the Privacy Act is released, the tape should be erased.

Refer to the manuals *Using Tapes at NIH* and *Batch Processing and Utilities at the NIH Computer Center* for more information. Tape-related documentation is available from the CIT publication ordering facility. See Section 6.

The NIH Computer Center provides the most up-to-date information regarding tapes on the World Wide Web at:

http://silk.nih.gov/silk/tapes

13.5.1 Tape Standards

The NIH Computer Center is a standard-labeled facility. A complete description of DFSMS/MVS Standard Tape Labels may be found in the manual, *DFSMS/MVS Using Magnetic Tapes, SC26-4923*.

The following classes of tapes are provided by the Information Media Library:

18-track standard-labeled 38000 BPI (standard cartridge tape)
9-track standard-labeled 6250 BPI
9-track standard-labeled 1600 BPI

The standard-labeled 3480 cartridge tape is the NIH Computer Center's standard tape. This tape has 18 tracks and stores information at 38,000 BPI. Capability for handling other tapes is provided primarily for compatibility with other computer installations. There are 3490E compressed tapes available on a limited basis for users with numerous 3480 standard cartridge tapes. Contact TASC for additional information.

Because drives are not available on all of the NIH Computer Center's subsystems, a /*ROUTE XEQ statement must be included in any job which uses a tape; see the manual *Batch Processing and Utilities at the NIH Computer Center*.

Only tapes with the following attributes can be handled at this installation. Users unfamiliar with the physical formats of 9-track tapes should refer to the manual *Using Tapes at NIH* for a detailed explanation and illustrations.

Figure 13-2. Tape Physical Requirements

TRACK	BPI (bits per inch)|	PARITY
9	6250 (GCR)*	not applicable
9	1600 (PE)**	ODD ONLY
18	38000	not applicable

*GCR - group coded recording
**PE - phase encoded

At the NIH Computer Center, all data sets written on a tape are written with the same parity and density. However, tapes imported from other installations may have multiple data sets that vary in parity and density. Such tapes can sometimes be read successfully with PALTAPE. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

13.5.2 Scratch Tapes

A scratch tape is a tape that resides in the tape library but has not been assigned to a user. The following types of tapes are kept in the tape library for use as scratch tapes:

18-track standard-labeled 38000 BPI (standard cartridge tapes)
9-track standard-labeled 6250 BPI
9-track standard-labeled 1600 BPI

A user who calls for a tape in the course of a job is given a scratch tape unless a pre-assigned or passed volume is specified. Refer to *Using Tapes at NIH* for further information.

13.6 INFORMATION ABOUT DISK AND TAPE DATA SETS

Information on the location and status of data sets and storage volumes at the NIH Computer Center can be obtained with WYLBUR commands and batch jobs.

WYLBUR provides the SHOW DSNAMES command to list data set information for disk data sets. Many additional useful options are detailed in the *WYLBUR General Editing* manual.

Each morning, all online disks are mapped and the "Current " index is built. The Current index contains the name, volume or management class, space attributes and characteristics of all data sets that existed when the index was created. The CURRENT option of WYLBUR's SHOW DSNAMES command is used to display information about data sets in the Current index.

The "Past" index contains the name, volume, and migration number of each data set migrated before the implementation of System Managed Storage (SMS). The PAST option of the SHOW DSNAMES command references the Past . The WYLBUR ENTER RESTORE command is used to bring a migrated data set back to an online volume.

The batch procedure, ADSMAP, also provides information about disk data sets; see the manual *Batch Processing and Utilities at the NIH Computer Center*. Some of this information is not accurate for VSAM data sets. (See the *Using VSAM and AMS at NIH* preface for more information.)

These reports include several dates that are explained here:

CREATED	The date the data set was last updated (saved from WYLBUR or TSO, or written from the batch).
LAST USED	The date the data set was last accessed (used from WYLBUR or TSO, or read from the batch).
EXPIRATION DATE	The date printed for older data sets created by WYLBUR is the same as the date CREATED for WYLBUR data sets. All recently created data sets should have zeroes for this date. The NIH Computer Center does not support the use of expiration dates.
MIGRATE	Not in use.

SHOW DSNAMES
SHOW DSNAMES DATED lists the user's current data sets. The date each data set was written and the date it was last referenced are displayed. For example, SHOW DSNAMES DATED ON FILE might yield:

FILE

CREATED	LAST USED	MIGRATE	DSNAME
03/21/96	03/22/97	—	MEMO.MEETING
04/26/96	04/29/97	—	REPORT.FINAL
08/27/95	03/23/97	—	TRAVEL.PLANS

- SHOW DSNAMES ON CATALOG—searches the catalog and lists the user's cataloged data sets and the volume or management classes on which they reside. The management class will be displayed if a simple SHOW DSNAMES ON CATALOG is issued. If any additional option is specified (e.g., FULL), the actual volser for online data sets will be displayed instead of the management class.
- SHOW DSNAMES ON FILE—displays the user's data sets that exist in the FILE management class for public data sets.

- SHOW DSNAMES ON TMP—displays the user's data sets that exist in the TMP management class for public data sets.
- SHOW DSNAMES ON MSS—displays the user's data sets that exist in the MSS management class for public data sets.
- SHOW DSNAMES ON vol, where "vol" is the dedicated disk volume name—displays all the users' data sets that exist on that volume at the time the command is issued.
- SHOW DSNAMES FULL—displays complete characteristics for each current data set.
- SHOW DSNAMES BOTH FULL—displays complete characteristics for both current data sets and data sets migrated prior to the implementation of SMS.

DISKMAP
DISKMAP is a batch procedure that will produce a listing showing all data sets stored on a specified dedicated disk (private volume), along with a description of their technical characteristics. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

ADSMAP
ADSMAP is a batch procedure which duplicates the functions of WYLBUR's SHOW DSNAMES CURRENT command to create a nicely for matted report providing information about a user's data sets on public volumes. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

DB2.SPACE1
Users with DB2 data can determine the number of tracks they have allocated by logging on to DB2, getting into QMF, and entering RUN DB2.SPACE1 on the command line. This information is updated daily. Additional facilities for examining DB2 data are described at:

http://silk.nih.gov/dbtech

VOLSTAT
The VOLSTAT procedure, which is run as a batch job, can be used to list information on each tape volume owned by a user. VOLSTAT creates a status report that lists the volume serial number, the initials and account, the title, and device type for each volume. It also indicates the date on which each volume was issued and last used, when it may be eligible for release due to inactivity, and the type of tape. VOLSTAT also has many useful capabilities to change the attributes of a tape. Refer to the manual *Batch Processing and Utilities at the NIH Computer Center*.

13.7 BACKUP/RECOVERY FOR DISTRIBUTED DATA

The NIH Backup and Recovery Service (NBARS), using ADSM (Adstar Distributed Storage Manager) software, allows NIHnet-connected users to back up and recover data stored on LAN servers and desktop computers. ADSM clients are available for a variety of platforms, including Windows, Windows 95, NT, Macintosh, and Unix. This backup/recovery service

for distributed data provides an economical, secure, reliable, central mechanism for backing up and restoring data across interconnected LANs, without manual intervention by users. Backed up files are stored and protected in the secure NIH Computer Center facility on a combination of high-capacity disks and tapes. Features of this automatic backup system include:

- automatic scheduled backup on predetermined schedule
- user-initiated backup on "demand"
- rapid recovery, day or night
- easy specification of what files to back up and how many versions to keep
- incremental backups that copy only the files that have changed since the last backup
- "point and click" file recovery
- graphical user interface
- secure and inexpensive storage
- no limit on size or location of groups
- online tutorial
- administration through a Web browser

There are several ways to become a user of the NIH Backup and Recovery Service:

- If there is already a custom policy domain established for your workgroup or LAN, and the administrator for that domain approves, you may join that domain without any registration. You do not need a CIT account/initials to join a custom domain. The administrator for that domain will assign your node name and backup schedule. If you need help determining if there is an existing custom domain for your group, or have trouble contacting its local administrator, please call TASC.
- If there is no existing custom policy domain for your group, you can set up a new custom domain with yourself as administrator.
- You can register your computer for the "NBARS public policy domain" by using the form on the NBARS Web site. Because of billing requirements, you must have a CIT account and initials or Helix ID registered in your name to join this public domain. As a member of the NBARS public policy domain, you will use the default backup parameters defined for NIH, and you may choose from a selection of pre-defined backup schedules. When your registration is complete, you will be sent your assigned node name via e-mail.

For more information, online registration for NBARS, or free client software, visit the World Wide Web site:

http://silk.nih.gov/silk/nbars

14 HARDWARE FACILITIES

This section describes the equipment at the central facility, including the OS/390 (MVS) Enterprise System and the Enterprise Open Systems (Unix-based), and information concerning other hardware devices used to access the central complex.

14.1 OS/390 (MVS) SYSTEM CONFIGURATION

The OS/390 (MVS) component of the NIH Computer Center is an integrated computing facility composed of multiple processors interconnected by over four hundred volumes of shared direct access storage and common operating system software. The system has a complement of peripheral devices that include tape drives, communications controllers, and electrographic printing subsystems.

Where possible, the peripheral devices can be manually switched to one or more of the processors. Many devices are also accessed through multiple data channels within a processor. This switching and multiple channel access allow for minimal disruption of service in the event of a subsystem or component failure.

A summary of the major hardware components exercised at the NIH Computer Center follows; additional information may be obtained from the *IBM ESA/390 Principles of Operation*, SA22-7201 and in the various component description manuals. The central processor identification numbers can be found at the back of each issue of *Interface*.

A hardware list for the IBM OS/390 (MVS) System follows:

Model	**Item Description**
9672-R44	Central Processing Units
ILK 3762	Ethernet Interface for TCP/IP
RAMAC (9392-B13)	Direct Access Storage Device
3480	Cartridge Tape Drives (18 track, 38,000 BPI)
3490E	Cartridge Tape Drives (36 track, 38,000 BPI)
3494	Automated Tape Library
3422	Tape Drives (6250/1600 BPI)
STK 9840	Ultra High Performance Magnetic Tape Drives
3990	DASD Cache Storage Controllers
3745	Communications Controllers
3900	Laser Printing Subsystems
3160	Cut-sheet Laser Printers
4245	Impact Printers
8010	Datastream Protocol Converters
3172	Channel to Ethernet Interface
NCR 5665	Communications Controller System
STK 9310 (Powderhorn)	Automated Tape Library (Silo)
STK 9490 (Timberline)	Cartridge Tape Drives (36 track, 38,000 BPI)

14.1.1 External Device and Channel Specifications

The central processors may have a great variety of external devices attached including tape drives, disk drives, printers, and terminals. Data going between the processor complex and the external device passes through a logical path called a channel. Channels are the direct controllers of all input/output devices. They provide the capability of reading or writing data at the same time that actual computing is taking place by relieving the processor complex of the task of communicating directly with the device.

14.1.1.1 Direct Access Device Specifications

9392-B13 RAMAC Disk Storage (logical 3390**)**

- 50,085 tracks/logical volume
- 15 tracks/cylinder
- 3,339 cylinders/logical volume
- 56,664 bytes/track
- 849,960 bytes/cylinder
- 2.838 gigabytes/logical volume

14.1.1.2 Magnetic Tape Device Specifications

3480 Magnetic Tape Subsystem

- tape cartridge
- 18 parallel tracks
- 38,000 bytes/inch recording density
- high speed search
- 3 million bytes/second data transfer rate
- dynamic error recovery techniques

3490E Magnetic Tape Subsystem

- cartridge tape and enhanced capacity cartridge tape
- 36 track recording format
- 76,000 bytes/inch data density
- high speed search
- 4.5 MB per second data transfer rate
- resident error-recovery procedures
- Improved Data Recording Capability (IDRC) feature

3422 Tape Subsystem

- 125 inches/second tape speed
- 6250/1600 bytes/inch recording density
- 3 million bytes/second data transfer rate
- 3 inch inter-block gap (6250BPI
- 6 inch inter-block gap (1600BPI)

9840 Magnetic Tape Drives

- cartridge tape system - dual-reel inside the cartridge; tape is always enclosed
- tape load point - at the middle of the tape for faster loading and searching
- cartridge external physical form factor - same as 3490E and 3480 cartridges
- 20GB uncompressed cartridge capacity - up to 80GB for highly compressed data
- tape speed - read/write 79 inches per second (IPS); rewind - 315 IPS
- up to 20MB/second data rate for compressed data
- ESCON channel connected to IBM OS/390 systems
- mostly located within StorageTek Automated Tape Libraries
- separate control unit for each tape drive

14.1.1.3 Output Device Specifications

3900 Wide Advanced Function Continuous Form Printer

- all-points addressable printing
- 229 pages/minute
- multiple fonts
- graphics capability
- variable spacing

3160 Electrophotographic Cut-sheet Laser Printer

- all-points addressable printing
- low-power laser electrophotographic print technology
- speeds of up to 60 impressions per minute in either simplex or duplex mode
- landscape (11 x 8 ½ inch) or portrait (8 ½ x 11 inch mode on cut sheet forms with a 3-hole punch option
- resolution of 600 x 600 picture elements (pels)

4245 Impact Printer

- 132 characters/line
- 2000 lines/minute (max) depending on print train use
- 6 or 8 lines/inch vertical spacing

14.1.2 Remote Printers and Workstations

RJE workstations offer a secure method of connecting to the NIH Computer Center from the user's office or laboratory.

A wide variety of bisynchronous workstations have been used as RJE workstations connected to the NIH Computer Center. In general, a bisynchronous workstation that is compatible with any IBM model RJE workstation can be used for remote printing and job entry.

CIT recommends the BARR/HASP Remote Job Entry Workstation package as a convenient and cost effective method of connecting to the NIH Computer Center to submit jobs and data from a remote location and to receive data and printed output at a remote location. BARR/HASP consists of a communications card and program that operates on DOS-based software. BARR/HASP supports the attachment of printers of many different speeds and prices. Users can call TASC for further information.

Printers that are part of the SNA network can be defined as remote RJE printers. Call TASC to request that a particular printer be defined (you must know the VTAM node name of the printer).

An RJE workstation request form is available from TASC. For further information, refer to the *Remote Job Entry Workstation Guide,* which is available through the CIT publication ordering facility.

14.2 ENTERPRISE OPEN SYSTEMS (UNIX) CONFIGURATION

The hardware for the Enterprise Open Systems includes:

- Compaq AlphaServer GS60
  - 4 CPUs (500 MHz EV6)
  - 4 GB RAM
- Compaq/Digital AlphaServer 8400
  - 4 CPUs (440 MHz)
  - 4 GB RAM
- Numerous Compaq/Digital AlphaServers: 1000s, 1200s, 2100s, and a 4100

- Sun Enterprise 250 servers

14.3 WINDOWS NT/2000 APPLICATION SERVERS

The NIH Computer Center has rack-mounted Compaq servers that meet minimum levels that CIT has determined to be required for data center-level robustness. CIT acquires and "builds" (configures) these servers and does not accept servers from other sources.

14.4 OTHER HARDWARE DEVICES

It is possible to acquire other types of hardware devices to be connected to or to communicate with the NIH Computer Center. Such hardware could include special displays, analog processors, and other special purpose devices.

Any user contemplating the acquisition of special hardware should write a memo to TASC when the project is being formulated. A meeting will be set up to discuss the feasibility of the request as it relates to the central facility. Points such as selection, acquisition, and costs of the hardware and related special control units will be covered. Most importantly, the software system needed to drive the special gear will be discussed in detail since any interaction with or demands on the NIH Computer Center staff or the operating system of the central facility must be carefully evaluated. No special gear will be tied into the central facility until all such details have been fully resolved.

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NIH Computer Center User's Guide

Document Evaluation

Is the Manual:

	YES	NO
Clear?	☐	☐
Well organized?	☐	☐
Complete?	☐	☐
Accurate?	☐	☐
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NIH Computer Center
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